MINING WORLD

December 1957

OF GOOD

FOR 1958

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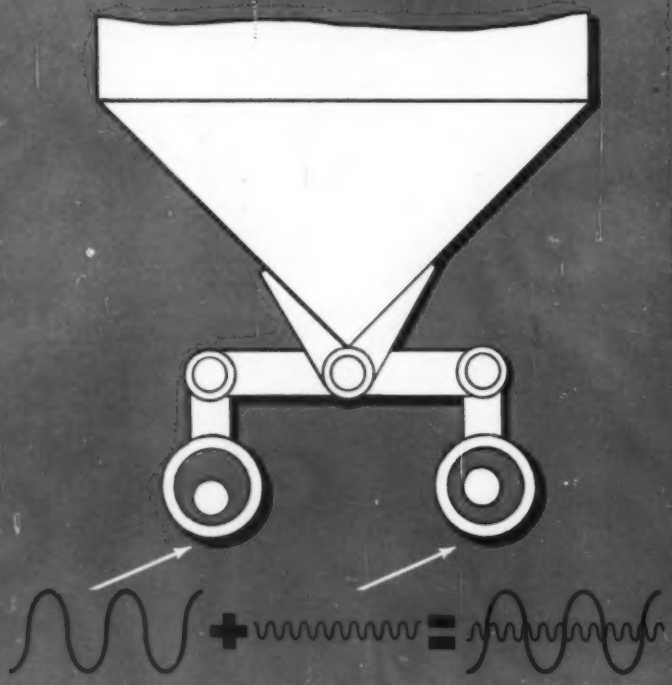

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Boulder blasting with the Terrier LH. (Left).
Plug-hole drilling in concrete. (Below, Left).
Scaling with the Terrier LTS (note the convenient leg support). (Centre).
Survey hole drilling, using the BMK 11 pneumatic pusher. (Right).

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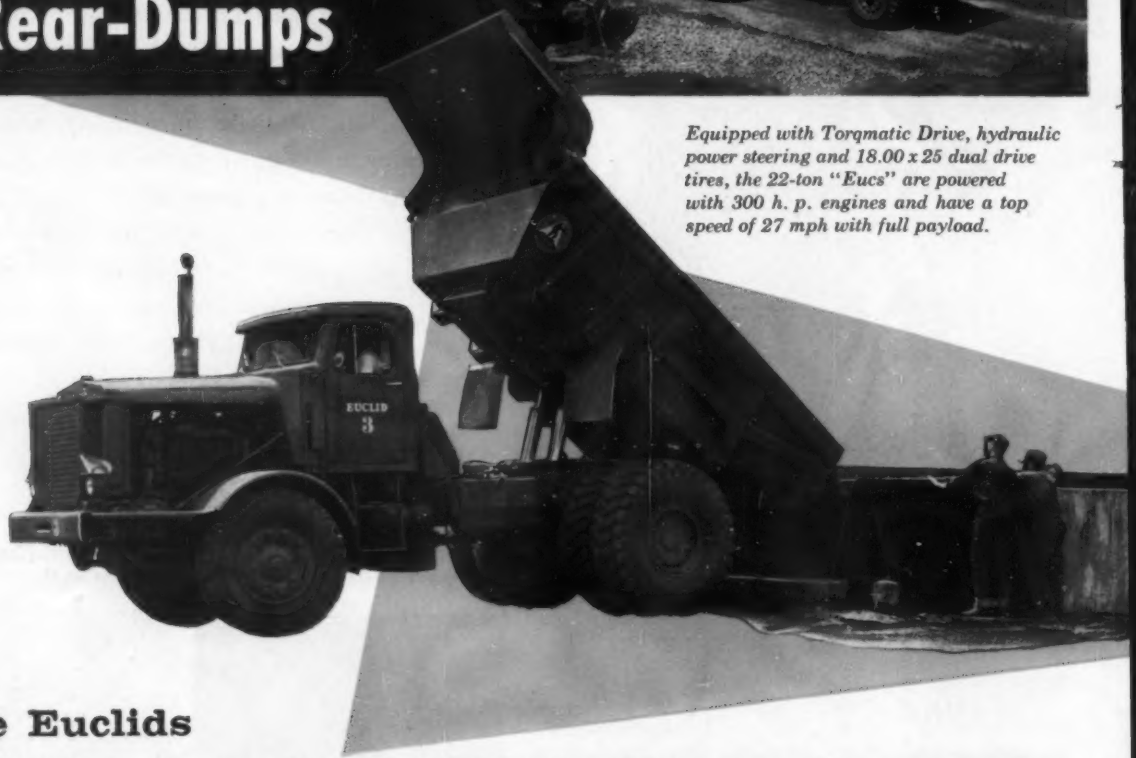
87% Availability with "Euc" Rear-Dumps



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Five Euclids haul 2500 tons of rock daily for Dragon Cement Co.

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The dependable performance of "Eucs"—job-proved on hundreds of mine, quarry and industrial operations—results in more work done at lower cost per ton. Your nearby Euclid dealer will be glad to provide you with facts and figures on the complete line of Euclid earthmoving equipment... and show you why ***Euclids are your best investment.***

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FOR MOVING EARTH, ROCK, COAL AND ORE

Mining World

Including the Export Edition **WORLD MINING**

Published monthly except in April when publication is semi-monthly

VOLUME 19 **DECEMBER 1957** No. 13

OPERATIONS—TECHNOLOGY

Mining & Milling

Money Making Methods

Interview

Ghost Camps

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IN THE NEWS

DEPARTMENTS

ON THE COVER

The Mining World Staff sends you a Lode of Christmas Cheer and Best Wishes for a Happy New Year.

READERSHIP RESEARCH

mf MILLER FREEMAN PUBLICATIONS

ABP ABC

MINING WORLD, December, 1957. Volume 19, No. 13. Published monthly except April, when publication is semi-monthly at Emmett St., Bristol, Conn. Executive, advertising and editorial offices, 500 Howard Street, San Francisco 5, California. Subscription in United States, North, Central, and South America, $4.00 per year; other countries, $5.00 per year. Entered as second class matter Oct. 10, 1951 at the Post Office at Bristol, Conn., under act of March 3, 1879. Postmaster: please send notice 3579 to MINING WORLD, 500 Howard Street, San Francisco 5, Calif.

NEW! THE CAT* NO. 7G BULLDOZER

Blade tilts 3′ to either side!

Teeth slice through hard materials!

Blade tips through a 16½° arc!

Teeth easily removed!

Teeth pick up and carry!

Handles easily!

'DOZER AND RIPPER IN ONE

The brand-new Caterpillar No. 7G Bulldozer is a completely different type of bulldozer. The amazing tilt-tip action, and its four heat-treated cast steel teeth, are an entirely new concept in 'dozing. The Gyrodozer is both a 'dozer and a ripper.

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Published by American Trade Journals, Inc.
Wm. B. Freeman, President
L. K. Smith, Vice President
E. P. Hoener, Vice President
Miller Freeman, Jr., Sec-Treas.
WORLD MINING is published the 26th of each month as a regular department of MINING WORLD and is also circulated as a separate publication on a carefully controlled free basis to a selected list of management and supervisory personnel associated with active mining enterprises throughout the world.

Mining World Subscription Rates
U.S., North, South and Central America $4.00
Other Countries $5.00
Single Copies .....$ .50
Directory Number $1.00

CHANGE OF ADDRESS:
Send subscription orders and changes of address to MINING WORLD, 500 Howard St., San Francisco 5, Calif. Include both old and new addresses and zone numbers.

MILLER FREEMAN PUBLICATIONS

Drifts and Crosscuts

It's Easy To Buy A Mine

As 1957 draws to a close it is more and more apparent that two very large companies made important purchases of western mining property during the year.

Kennecott Copper Corporation is paying $450,000 for copper-molybdenum-gold claims in Washington, and the United States Steel Corporation optioned seven placer claims in Wyoming. The purchases, while news during the year, are not significant because both corporations have ample funds and financial reserves to make hundreds of similar purchases during any year. The actual purchases were not the significant news.

The significant news is that in both instances, to obtain additional mineral reserves, the corporations are purchasing rather than discovering. This is a tribute to the never discouraged pioneer prospectors who made the discoveries and an indirect condemnation of today's scientific seekers in their airplanes, libraries, and laboratories. Hard headed business executives at both corporations figured it was cheaper to buy than to find. But don't miss the fact that today's scientists can't discover already discovered mineral deposits.

The real story behind these purchases is the courage, faith, and determination of the discoverers and their heirs who knew they had a mine through years of hardships and sacrifice necessary to hold title. Kennecott's purchase was from the Glacier Peak Mining and Smelting Company, a 50-year-old firm, with today's stockholders being children and grandchildren of the original discoverers. Their faith continued unabated despite the fact that the M. A. Hanna Company, International Smelting and Refining Company, and others had examined, drilled, and otherwise tested the claims.

United States Steel's option covers 1,120 acres from the Wyoming Mica & Metals Corporation near Atlantic City, Wyoming. Steel is seeking magnetite iron ore. Wyoming Mica is one of the pioneer mining corporations of Wyoming. Its stockholders, many from northern California, have kept their company intact through the years.

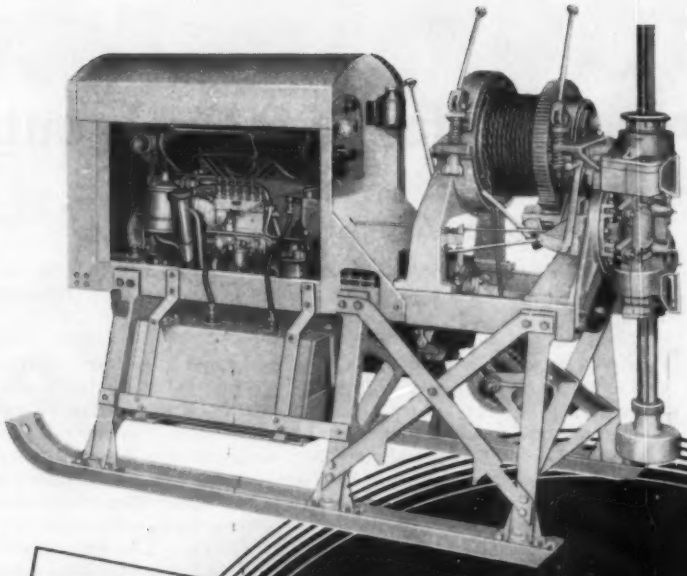
Congratulations to the founders and the stockholders of these small companies. Truly theirs has been a greater accomplishment than just buying a mine.

How To Use MINING WORLD'S 1957 Index

Each issue of MINING WORLD is full of important reports and tips on how such an operation supports plastic pipe, or how another company drills multiple burn-cut rounds. In addition there are up-to-the-minute reports on activities at hundreds of mining companies in all parts of the world.

Use the index on page 90 of this issue to keep a record of these developments. A carefully designed system of cross indexing makes it possible for you to look up any article printed during the year. Each has scores of good tips. All companies whose continuing activities have been described are listed alphabetically under the heading "News." Major articles are listed under each of these main headings: (1) by author, where applicable, (2) by mineral commodity produced or treated, (3) by geographical location, and (4) by exact title of the article.

This special index is another service to readers. MINING WORLD readers use, retain, file, and reuse each issue throughout the year. This index is your engineering tool to make your copies more valuable to you.



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Boyles Bros. famous BBS-2 surface core drill is powered by a dependable Perkins PV 6 motor. Here is the versatility of five interchangeable swivelheads 1½" to 12" holes—combined with the fuel and operating economy of diesel power.

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BUS-23HH	("H" size hydraulic)	3350 lbs.
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capacities up to 3500 ft.

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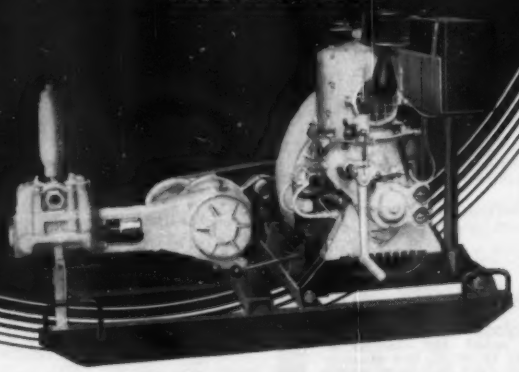

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MINING WORLD NEWSLETTER

San Francisco . . . Washington . . . Bartow

December 1957

What has been the outstanding metal of the year?

MINING WORLD editors are currently puzzling over this as they prepare the annual Industry Review and 1958 Preview.

Boron, last year's choice, still rides high as the rocket fuel of the future. Sparked by Sputnik, we should expect great things in the rocketry field. Dedication of the new $20,000,000 open-pit mine and refinery of U.S. Borax & Chemical Corporation at Boron, California testifies to their confidence in the future of boron.

Molybdenum is a strong contender as one of the few metals today maintaining a steady price and a high demand. Molybdenum-base alloys will become important structural materials in the jet propulsion field. Molybdenum disulfide lubricants are being used for mining and heavy-duty construction equipment. The proposed merger of Climax Molybdenum Company, the world's largest producer, with American Metals Company should provide greater working capital for research and expansion.

Uranium cannot be overlooked. Since it is no longer a scarce item, it may have wider commercial applications now. Mallinckrodt Chemical Works expects to have uranium enriched metal facilities available after the first of next year.

Final selection will be announced next month.

Spokesmen for the lead-zinc industry presented a strong case before the U.S. Tariff Commission hearings in November.

Representatives from mining associations and mining and smelting companies in all parts of the United States participated.

Maximum possible tariff per pound is 1.2¢ for zinc in ore, 1.4¢ for zinc metal, 1.05¢ for lead in ore, and 1.49¢ for lead metal.

The Arizona Copper Tariff Board, meanwhile, has prepared facts and figures outlining copper production costs designed to show how unrealistic is the existing copper "peril point" of 24¢.

Nuggets of news as we went to press:

First commercial recovery of fluorine as a byproduct of Florida's vast phosphate industry is just ahead. Fluorine, in the form of fluosilicic acid, will be reclaimed by International Minerals & Chemical Corporation from processing of phosphate chemicals. A five-year contract to supply Kaiser Aluminum & Chemical Corporation with more than 10,000 tons has been negotiated.

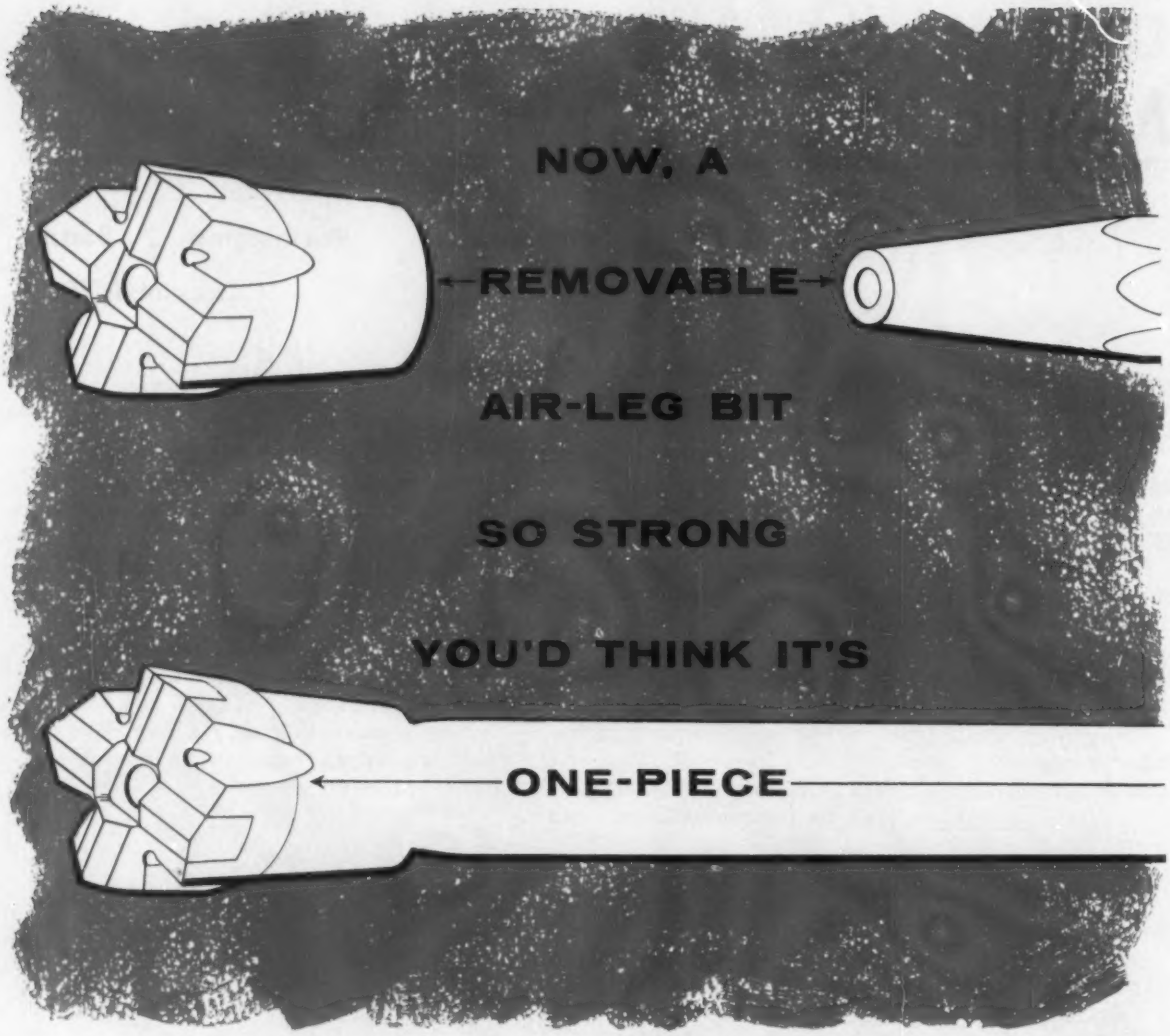
A phosphate rock deposit containing about 700,000,000 tons of medium-grade ore will be developed by the Stauffer Chemical Company and San Francisco Chemical Company, 15 miles north of Vernal, Utah.

Bunker Hill Company plans an intensive search for lead and zinc in Guatemala.

A new crushing and sizing plant is being erected at the No Agua perlite deposit in northern New Mexico where Great Lakes Carbon Corporation will undertake a major expansion program.

An ilmenite deposit has been located by American Smelting and Refining Company on optioned property near Lakehurst, New Jersey.

Prospecting for bauxite on the island of Jamaica will be undertaken by Harvey Aluminum which just received exclusive licenses on government land in six parishes.



THE new Timken® tapered socket bit for air-leg drills is removable—yet has the strength of one-piece steels. The tapered union gives you all the advantages of removability without the weaknesses that cause other removable bits to fail on air-legs.

Because the new Timken tapered socket bit is removable, you get all these advantages that intraset steels can't give:

You don't have to throw away the drill steel just because the carbides wear out. You do with intrasets.

You carry just a pocketful of bits into the mine. With intrasets you carry an armload of steel.

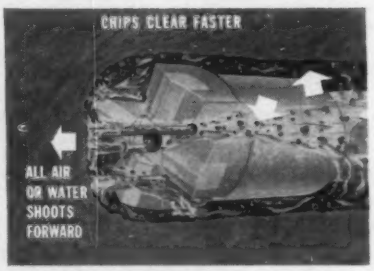
You can quickly change bit gauge sizes using the same steel. You have to change a whole steel with intrasets.

You don't have to lug the whole steel back to the shop to resharpen the cutting edges. You do with intrasets.

You get four carbide cutting edges, which insures longer gauge wear.

Two new frontal design features enable the Timken tapered bit to clear chips faster (see picture at right). And new special-analysis carbide inserts give superior wear-resistance with added shock-resistance. You can recondition them many times.

For removability *and* strength, use the new Timken tapered bit—the air-leg bit of the future. Write for free brochure. The Timken Roller Bearing Company, Rock Bit Division, Canton 6, Ohio. Cable address: "TIMROSCO".



CHIPS CLEAR FASTER because 1) five front holes shoot water or air directly against the rock face and 2) deeper, wider wing clearance lets chips wash back faster.

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THE AIR-LEG BIT OF THE FUTURE

Capitol Concentrates

DMEA Order Lowers Loan Ceiling On Several Mineral Commodities

The Defense Minerals Exploration Administration has reduced the government's exploration participation from 75 percent to 50 percent on a considerable list of minerals. The change became effective October 22, 1957.

It is amusing to note that tungsten remains on the list of eligible minerals although the government's participation is reduced to 50 percent. Many a mine operator is asking who would be so brash as to match funds with the government to explore for tungsten. As a matter of fact there is one such hardy soul—Ralph E. Shupe of Inyo County, California, who is venturing into a $70,680 project. He got in just under the wire with a 75 percent government participation contract. What he will do with any tungsten discovered is a real mystery.

On the basis of quantity, the majority of applications lately are for uranium and mica, with a mere sprinkling of other minerals.

Under DMEA Order 1, Revised, effective October 22, 1957, the government's portion of allowable costs of exploration was reduced from 75 percent to 50 percent for the following commodities: asbestos (chrysotile only), columbium, corundum, diamonds (industrial), kyanite (strategic), mercury, monazite and rare earths, platinum group metals, quartz crystals (piezo-electric), tantalum, thorium, tin, tungsten, and uranium. Other commodities which are eligible for 50 percent government participation are: bauxite, cadmium, chromium, copper, fluorspar, graphite (crucible flake), lead, molydenum, and zinc.

Under DMEA Order 1, Revised, the following commodities remain eligible for 75 percent government participation: antimony, beryl, cobalt, manganese, mica (strategic), nickel, rutile-brookite, selenium, and talc (block steatite).

The Office of Defense Mobilization recently certified $4,800,000 additional borrowing authority to finance exploration aid during the fiscal year 1958 under the DMEA program.

• Increasing Pressure Is Noted

Many of our mining people may have overlooked the fact, or forgotten it, but in 1954, when President Eisenhower refused to act on the Tariff Commission's recommendation and increase lead and zinc tariffs, the President of Mexico in his State of the Union message to the Mexican Congress remarked:

"The decision of President Eisenhower of not authorizing the increase in lead and zinc tariffs has been greatly appreciated by the Government of Mexica and by the Mexican people who derive their livelihood from mining, because it contributed to avoid a new crisis in our mining industry."

The U. S. Tariff Commission will conduct a hearing on November 19 of this year to formulate another recommendation for increased duties. Rumor has it that the atmosphere may not be as cordial this time as there have been three changes on the commission since the last hearings. Because the prices of lead and zinc still are weakening, pressure to do something grows greater and so does the pressure from other interested countries to have the President do nothing.

• Slow-Down in Mineral Purchases Indicated

The word is said to have gone out from the White House to the General Services Administration to tighten down as much as possible on all mineral purchase contracts and to look closely at them for any chance of modification in favor of the government, or to cancel if any reasonable cause can be found for doing so. At the same time ODM has authorized GSA to make its usual monthly call for lead and zinc. It appears that there is some fear of political repercussions if GSA withdraws its support from the already weak market before the Tariff Commission takes some action. Meanwhile, imports of lead and zinc show substantial increases over last year, so in effect GSA is buying foreign metal.

• Canada's Opposition Presents New Threat

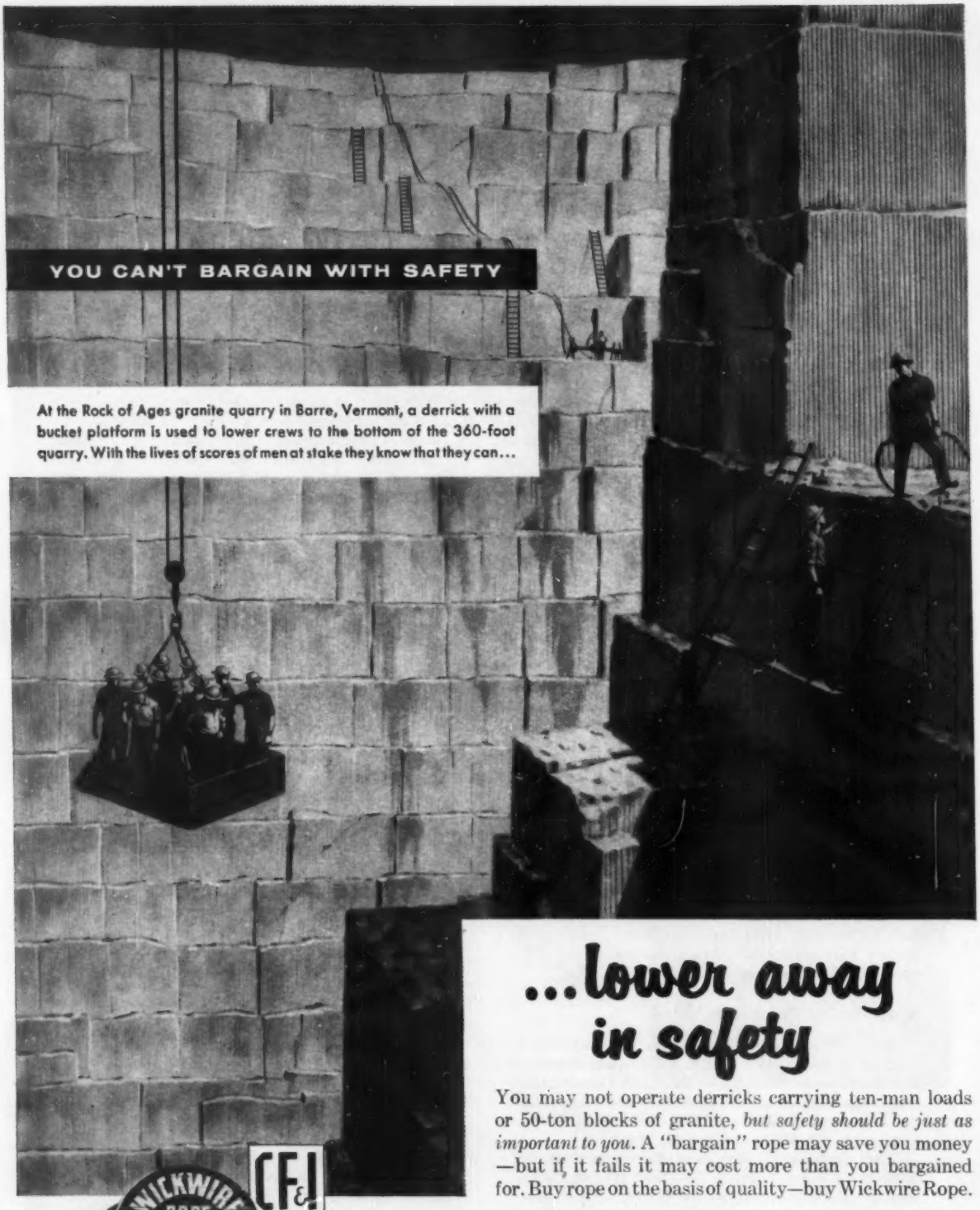
At a recent United States-Canadian economic conference, Canada is said to have complained bitterly about the Interior Department's long-range minerals policy to increase the tariffs on lead and zinc, and to have threatened drastic reprisals. Because of Canada's opposition, the State Department may influence the President to reduce Tariff Commission escape-clause recommendations if such recommendations are for maximum increases.

• Review Of Stockpile Needs Planned

The Office of Defense Mobilization plans a complete review of the nation's stockpile of strategic and critical minerals and materials, now that the Administration has shortened its estimate of the length of a future all-out war from five to three years.

The review, according to an ODM spokesman, will be made by a soon-to-be-named committee of from 8 to 12 persons from outside government who have an "objective viewpoint." None of the committee members will be connected with an industry which supplies commodities to the stockpile.

The committee's analysis of the nation's $6.5 billion stockpile, it is reported, will take into consideration the following three eventualities: (1) a "cold" war with little or no fighting, but with high tensions and the possible loss of some sources of overseas supplies; (2) a "brush fire" with more conventional outbreaks of fighting—not nuclear—where overseas supplies may be disrupted; and (3) full-scale nuclear attack. Also, some consideration may be given to the desirability of stockpiling finished goods rather than raw materials. January has been set as ODM's goal for the committee's preliminary findings.



At the Rock of Ages granite quarry in Barre, Vermont, a derrick with a bucket platform is used to lower crews to the bottom of the 360-foot quarry. With the lives of scores of men at stake they know that they can...

...lower away in safety

You may not operate derricks carrying ten-man loads or 50-ton blocks of granite, *but safety should be just as important to you.* A "bargain" rope may save you money —but if it fails it may cost more than you bargained for. Buy rope on the basis of quality—buy Wickwire Rope.

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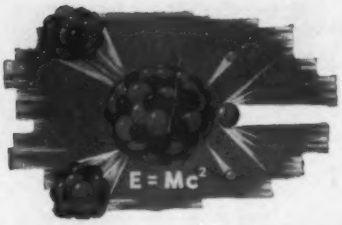


FISSION FACTS

Monthly Roundup of Mining News
In the Atomic Energy Field

Ambrosia Lake . . .

Four Mills and 14 Major Shafts Awaken Uranium Giant

Let's take another trip to the famous Ambrosia Lake uranium district northwest of Grants, New Mexico. It has been 16 months since we visited that growing area. In August 1956 we went together over the dust-pocket-filled, rut'ed, heavily-traveled road north from Grants. Now we leave Grants on a cloudy, over-cast, rainy day and drive north toward San Ma'eo. How the road has changed. It is now a wide, well-graded, paved highway; the traffic is virtually bumper-to-bumper in both directions. Cars of miners and construction men, pick-ups full of men on the way to work, and trailer houses being towed to the "camp" in Ambrosia Lake. Suddenly a yellow school bus loaded with children passes on its way to Grants. Trucks of every type and size travel north to the new mills and mines, carrying cargo of all sorts. Ore trucks, Diesel fuel trucks, concrete pre-mix trucks, giant flatbed trucks loaded with filters, flatbed trucks with many thousands of board feet of timber, while still others carry prefabricated steel columns, beams and sections. Many lowboys carry brand new compressors, Diesel electric power plants, mining machinery, Caterpillar tractors. Perhaps strangest of all are the many long-distance semi-trailer trucks belonging to trans-con'inental trucking companies. They now visit the mines and mills several times a day on their coast-to-coast runs. At each they unload high-priority parts and cargo shipped only a few tens of hours ago from Denver, Chicago, Los Angeles, and other key, important mining distribution centers.

There is much to see as we drive north over the new highway, and suddenly in the distance looms a new silver water tank. As we approach we see that it is at the new 750-ton-per-day uranium mill of Homestake-New Mexico Partners. Steelwork is up, equipment is in place, workmen enclose the building with galvanized steel panels. Giant ore trucks roar up to the weighing station and quickly unload on the receiving dock. Alongside the new New Mexico Partners mill is a sign reading "Utah Construction Company Park Here" and almost a hundred cars and trucks belonging to workmen are parked at the sign. This is the site of the new 1,500-ton-per-day Homestake-Sapin Partners mill. Homestake will operate and manage both mills to treat ore from various Ambrosia Lake mines. The Partners mill will be in operation early in 1958, to become the first Ambrosia Lake mill.

Traffic thins as we drive on toward Ambrosia Lake, but ore-trucking continues heavily from Rio de Oro Uranium Company's Dysart mine. We reach the San Mateo turn-off. The road ahead leads to Calumet and Hecla's new 2,000-foot incline shaft to mine its marquez ore body. And from there to Rare Metals Corporation of America's $20,000,000 ore body which will be tapped through Ambrosia's newest shaft.

The paved road ends but a new gravelled highway turns off straight across the barren prairie, northwestward to the heart of Ambrosia. We drive along the new road and suddenly and prophetically the clouds part, the fog drifts away, and the bright sun sends its shining rays over Ambrosia. These rays strike and light up the forest of tall, steel headframes which now dot the Ambrosia Lake district. To the right is the new Section 32 mine of Homestake Partners. A giant portable Diesel electric power plant purrs 24 hours a day as it supplies power for pumping and mining operations. We drive on and see a new road extending east and a new road extending west from the main highway. The road to the right leads to the Phillips Petroleum Company's new Section 28 mine and 1,500-ton-per-day mill. Yes, there are a few drilling rigs left. On Section 33 a string of rigs are coring between the Phillips' shaft and the Section 32 shaft.

To the left we see a great concentration of activity on the side of a hill. This is Section 31 where Kermac Nuclear Fuels Corporation is building its giant 3,300-ton-per-day solvent extraction plant. This will be one of the world's largest uranium producers when on full stream late in 1959.

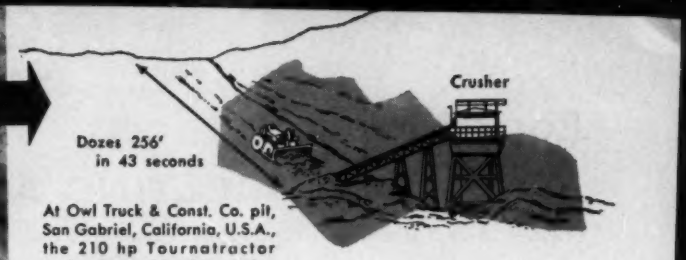
Now looking north we see steel headframes and gigantic cranes with booms up to 120 feet long piercing the Ambrosia sky. The cranes are used for erecting headframes and placing machinery at the new surface plants. The forest of drills that we saw in 1956 has become a forest of cranes and steel headframes. At our left is Kermac's new Section 30 mine. Concrete collar has been poured and men are busy erecting the steel headframe and pouring concrete foundations for the surface plant. Off to the immediate north is the "camp" where many of the original drillers parked their trailer houses years ago. Today it is a trailer village still, but something new has been added. It is a large Quonset hut which is used for a school room during the day and a recreation hall during the night.

The gravel road ends suddenly and we drop over the rim into Ambrosia Lake proper. And it is now a lake, at least east of the Rio de Oro shaft. The car skids on through the mud to the north, dodging the loaded ore trucks. There goes another 25 tons of ore from Rio, headed to the Partners mill 20 miles to the south. Ahead there's the steel headframe and massive ore bin of Rio's Dysart shaft. Physically there has been little change since our last visit, but there is a greater sense of activity, more trucks, more cars, more production. What's that behind the Rio shaft? Can it be, yes, it is a large oil well derrick. Has oil been found in Ambrosia? We wonder because the first uranium was found in the cuttings from a hole drilled in the search for oil. We check and see that the derrick is reaming a 42-inch ventilation hole for Kermac Nuclear Fuels Company. Its new Section 10 mine is several hundred yards to the west. A major stock-pile of ore is growing at this second producing Ambrosia mine. The third Ambrosia producer is Holly Uranium Company, mining a small ore body south of Rio.

Once again, as we did before, we take the road heading south and see where a new steel shaft, Butler buildings, giant piles of mine timber, ventilation pipe, air and water pipe, Diesel oil tanks, mine cars, and other equipment has replaced the early-day magic sign "Sabre." This is Homestake-Sapin's Sec'ion 15 mine where sinking is underway round the clock. This mine will soon become an important producer. Off to the south are two high headframes. The one to the east is Homestake-Sapin's No. 23 mine, where mining headquarters will be established. The shaft has been collared, the headframe erected, and sinking will be underway in a few weeks. To the west is Kermac's Section 22 mine where the first of three stations has been cut. Remember that in this area it will be necessary for multiple horizon mining to recover the great thicknesses of ore.

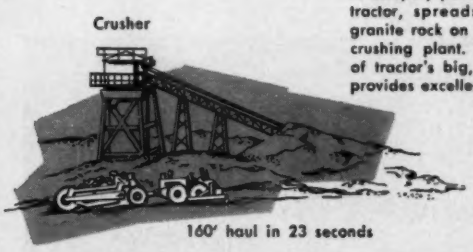
This is the mill building era at Ambrosia. This is the shaft sinking era at Ambrosia and the greatest shaft sinking era in the United States in many, many years. This is only the start of the shaft sinking and mine development program at Ambrosia.

Mining must rush to awaken the sleeping giant, Ambrosia Lake uranium, and what a giant it will be. It will take 2,000 men boring, pumping, pushing, lifting, hauling, loading, burrowing, driving, stoping, timbering, probing, testing, to bring forth more than a billion dollars worth of ore in the next nine years. And these 2,000 men will do it continuously, yet slowly, because the four mills can treat only 10,000 plus tons per day. And more than 30,000,000 tons of ore already have been proven in Ambrosia. Giant Ambrosia Lake uranium awakens with the rush expenditures of $75,000,000.



At Owl Truck & Const. Co. pit, San Gabriel, California, U.S.A., the 210 hp Tournatractor pushes heaped load to crusher at speeds to 7.5 mph.

A scraper, pulled by Tournatractor, spreads decomposed granite rock on stockpile near crushing plant. Rolling action of tractor's big, rubber tires provides excellent compaction.



Fast, rubber-tired tractor helps

produce 7,000 tons of granite road-base daily

The Owl Truck & Construction Co., Alameda, California, U.S.A., produces 7,000 tons of crushed, decomposed granite rock daily, at its San Gabriel, Calif. pit. The material is used widely for roadbase.

To achieve required production, the company tried two crawler-tractors for short-haul dozing of material to crushers. This method was found to be slow and expensive. Due to loose abrasive rock, crawler's tracks had to be replaced every 1000 hours. Owl Truck then purchased 2 modern LeTourneau-Westinghouse rubber-tired Tournatractors® to handle this phase of the job.

Here's how these rubber-tired tractors helped speed production:

512' dozing cycle in 1 min. 46 sec.

First, the decomposed granite rock is loosened. Then the Tournatractors, traveling in 3rd gear (7.5 mph), doze heaped load 256' down 12 to 15% grades to crusher in 43 seconds. Tractors then back up same distance in high gear (7.2 mph) in 1 minute 3 seconds, completing 512' cycle in 1 min. 46 sec. Fast dozing cycles like this helped boost production.

Tows scraper on long hauls

To move material long distances, one of the tractors occasionally tows an old LeTourneau-Westinghouse Carryall Scraper. With Tournatractor used as a prime-mover, the scraper self-loads 8 yds. in 37 seconds over 125', hauls 160' down 8% grade in 23 seconds, and spreads material on stockpile in 13 sec. (Stockpiled material is dozed to crusher by rubber-tired tractor when needed.) Tractor-scraper returns 334' to load area in 48 sec., completes a 695' cycle every 2 min. 1 sec. The one-man Tournatractor-scraper combination averaged 24 loads or 192 yds. of crushed rock per hour.

"Low maintenance costs"

Pleased with Tournatractor's performance, Pit Superintendent Walter C. Butler said, "This tractor definitely has a place in pits and quarries. The low maintenance costs and increased production show up well on the balance sheet." The operators were also enthusiastic about these rubber-tired tractors. Emery F. Dolson, Jr. says, "There is much less fatigue when operating a Tournatractor instead of a crawler."

Compare Tournatractor with present dozers

Compare this high-speed, go-anywhere rubber-tired tractor with your present dozing equipment. See how *you*, too, can increase pit production and reduce operating costs. Let us send you full details. CT-1562-QJ-1r

LeTOURNEAU-WESTINGHOUSE COMPANY, PEORIA, ILLINOIS

A Subsidiary of Westinghouse Air Brake Company

Where quality is a habit

Look first to:

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1. Fingertip electric controls

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3. Hinged body design . . . no frame, no springs

4. Big, multi-disc air brakes on all 4 wheels . . . selective brake control locks front or back wheels

5. Interchangeable tires and wheels, front and rear

6. All-steel body . . . with tri-level bottom

7. Wide bowl, with low rear entry, makes loading easier, faster . . . with less spillage

Reduce your pit costs

with high-production Tournapull® Rear-Dump haulers

Capable of high-production in all materials, with a minimum of maintenance, LeTourneau-Westinghouse Tournapulls with Rear-Dumps give you more for your money in productive hours worked . . . more in tons moved, at lower cost. Here is why!

Simplified construction

Rear-Dump construction is radically simplified from that of conventional haulers. In place of a foundation frame and body sub-frame, Tournapull prime-mover and trail unit are hitched together by means of a rugged, high, horizontal yoke. Yoke pivots horizontally on kingpin at front . . . then extends back along the sides of the bowl, where it is pivoted vertically just above and ahead of rear wheels.

Heavy-duty bowl resists shock, abrasion, and crushing damage of big chunk-rock dropped by excavator.

Big tires

There are no dual tire or mixed size problems. Big, single, low-pressure tires adequately absorb the shocks of rough off-road travel and shovel loading. Troublesome springs, spring hangers and tie-rods that require frequent maintenance and replacement are eliminated. Long-wearing tires are interchangeable all around . . . one spare serves an entire fleet.

2-wheel prime-mover

Front-wheel drive and kingpin-type steer further simplify Tournapull construction. A multitude of trouble-causing parts are eliminated. No longer must power be carried back to the rear through a long driveshaft . . . with its inherent bearing, universal joint, and lubricating problems. No longer is steering handled by small front wheels subject to misalignment from "bulldozing", as they try to get out of ruts. All compact machinery inside prime-mover case is readily accessible for quick adjustment, easy servicing.

Simple, safe dump action

A touch of electric switch on dashboard instantly activates point-of-action body-hoist motor. Entire dump is under power control — there is no free fall. There is no delay for hydraulic pressure build-up, no shock-loads, as with gravity dumping. You save on maintenance time, too, because there is no hoist maintenance to check, only a few places to inspect and lubricate.

For complete information

Find out how these savings can bring extra profits to you. There are three LeTourneau-Westinghouse Rear-Dump sizes to fit your requirements, with 11, 22 and 35-ton capacities. Write us for information.

R-1406-M-1r

LeTOURNEAU-WESTINGHOUSE COMPANY, PEORIA, ILLINOIS

A Subsidiary of Westinghouse Air Brake Company

Where quality is a habit

AMSCO TUBE ⊙ RODS

for semi-automatic HARDFACING

The perfect uniformity of Amsco Tube Rod insures smooth, trouble-free feed to the work. Note hardfacing alloy compactly enclosed within the steel tube.

Here are new, improved tube rods . . . *specially designed and engineered* for semi-automatic hardfacing! They have *proved* their speed, quality of weld and uniform deposit in actual use tests. In many cases, deposition rate has been increased up to 200% over other types of semi-automatic electrodes.

Amsco® Tube Rods are perfectly symmetrical, steel-shell wires, with the various alloys firmly enclosed and evenly distributed, for proper weld deposit. The steel shell is work-hardened to provide rods that will not deform or snarl during welding . . . that will run well in any semi-automatic welder. The rods are pre-lubricated, to insure constant and uninterrupted feeding to the work.

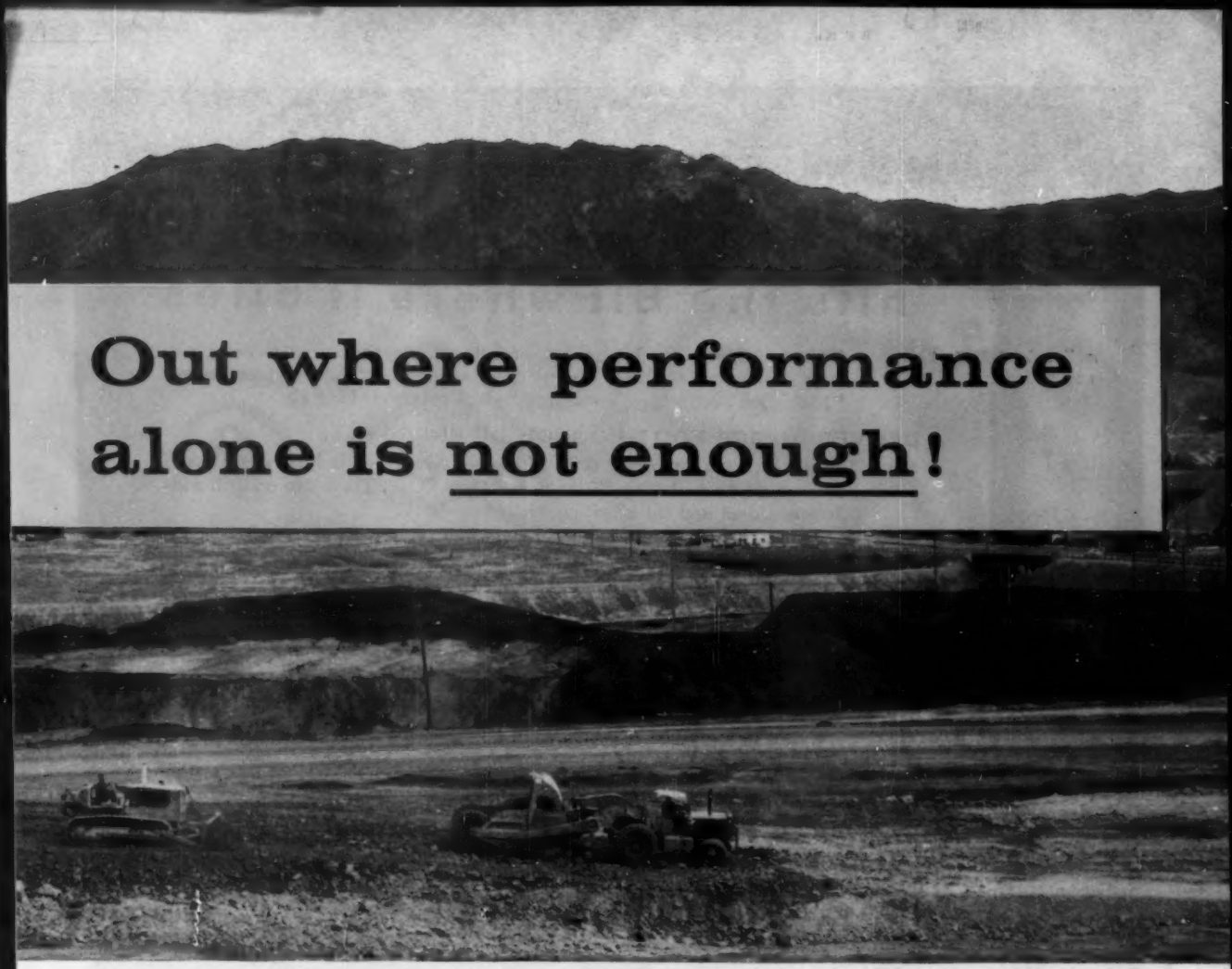
For additional information and technical data on Amsco Tube Rods or the Amsco MF Semi-Automatic Welder, see your Amsco Welding Distributor. Or write to Amsco Welding Department SA, Chicago Heights, Ill.

AMERICAN Brake Shoe COMPANY

AMSCO

American Manganese Steel Division • Chicago Heights, Ill.

OTHER PLANTS IN: DENVER, LOS ANGELES, NEW CASTLE, DEL., OAKLAND, CAL., ST. LOUIS; JOLIETTE, QUEBEC



Out where performance alone is not enough!

Near Butte, Montana, a CAT* DW20 Tractor works on a haul road at an open-pit copper mining operation. The road, half a mile long and 60 feet wide, had to go in fast. So a pair of DW20s with Scrapers dumped some 1600 cu. yd. of dirt per 8-hour day, and did it day in, day out till the job was done.

And that's the point: *day in, day out* till the job is done. For, on the hard jobs, performance alone, while mighty important, is not enough.

Sure, DW20 units give superior performance. Big capacity. Load easily. Big rimpulls that overcome grade and rolling resistance on rough roads. Ejection that gets rid of any kind of material quick. And, of course, high speed.

But the DW20 does more than a good job. It *stays* on that job. It shrugs off the down time that hurts you in your cost-per-yard figure. Your Caterpillar Dealer is ready with facts and figures to prove that the built-in durability of the DW20 means dollars and cents to you. He's ready, too, with expert service—and with replacement parts you *know* you can trust.

P.S.: Your Caterpillar Dealer will demonstrate the DW20 on your job, at your say-so—with any of its famous running mates: the new No. 456 Scraper with LOWBOWL design; the Athey PH20 Wagon specifically designed as an economical coal hauler (56 cu. yd. heaped load); and the Athey PD20 side dump Wagon with a heaped capacity of 25 cu. yd.

Caterpillar Tractor Co., San Francisco, Calif.; Peoria, Ill., U. S. A.

CATERPILLAR*

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WANTED—
THE HARD WORK

NEW GARDNER-DENVER "MOLE-DRIL"

(Trade-Mark)

hits the bit where it bites

This drill follows the bit right down through the rock. It cuts deep, big-bore holes . . . reduces drilling time and costs. The Gardner-Denver "Mole-Dril" adds more versatility to any rotary drilling rig.

DELIVERS MORE FOOT-POUNDS OF ENERGY . . .

to the bit than any other drill of its size. No power is lost regardless of drilling depth with this in-the-hole "Mole-Dril". There are no drill rods between drill and bit absorbing hammer shock.

DELIVERS AIR AT FULL PRESSURE FOR CLEANING

Hole cleaning ability is not completely dependent on exhaust air from drill. A separate air stream flows directly through bit at full line pressure to keep cutting face clean. The drill has up-cast exhaust air ports to give cuttings an added boost.

ONLY 3 MOVING PARTS

Rugged, simple construction delivers more work and less trouble. There are only nine major parts in the entire drill.

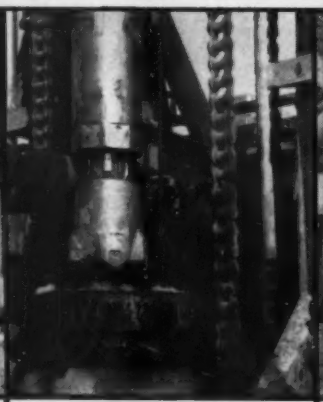
Two sizes available—here are the condensed specifications

	diameter	length	weight	recommended bit size
Model AM6	5¾"	38.6	200 lb.	6½"
Model AM4	4"	35.6	98 lb.	4¾"

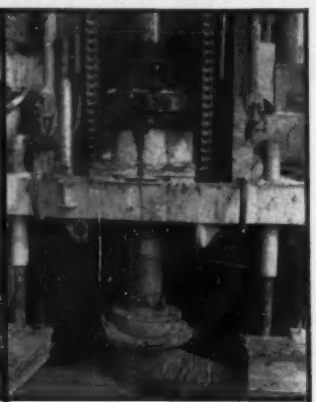
Get the most out of your rotary drilling rig . . . save money . . . drill faster . . . get the new Gardner-Denver "Mole-Dril"

Patent Pending

Drill screws directly to standard drill pipe . . .



Bit screws directly on to drill tappet . . .



and down they go

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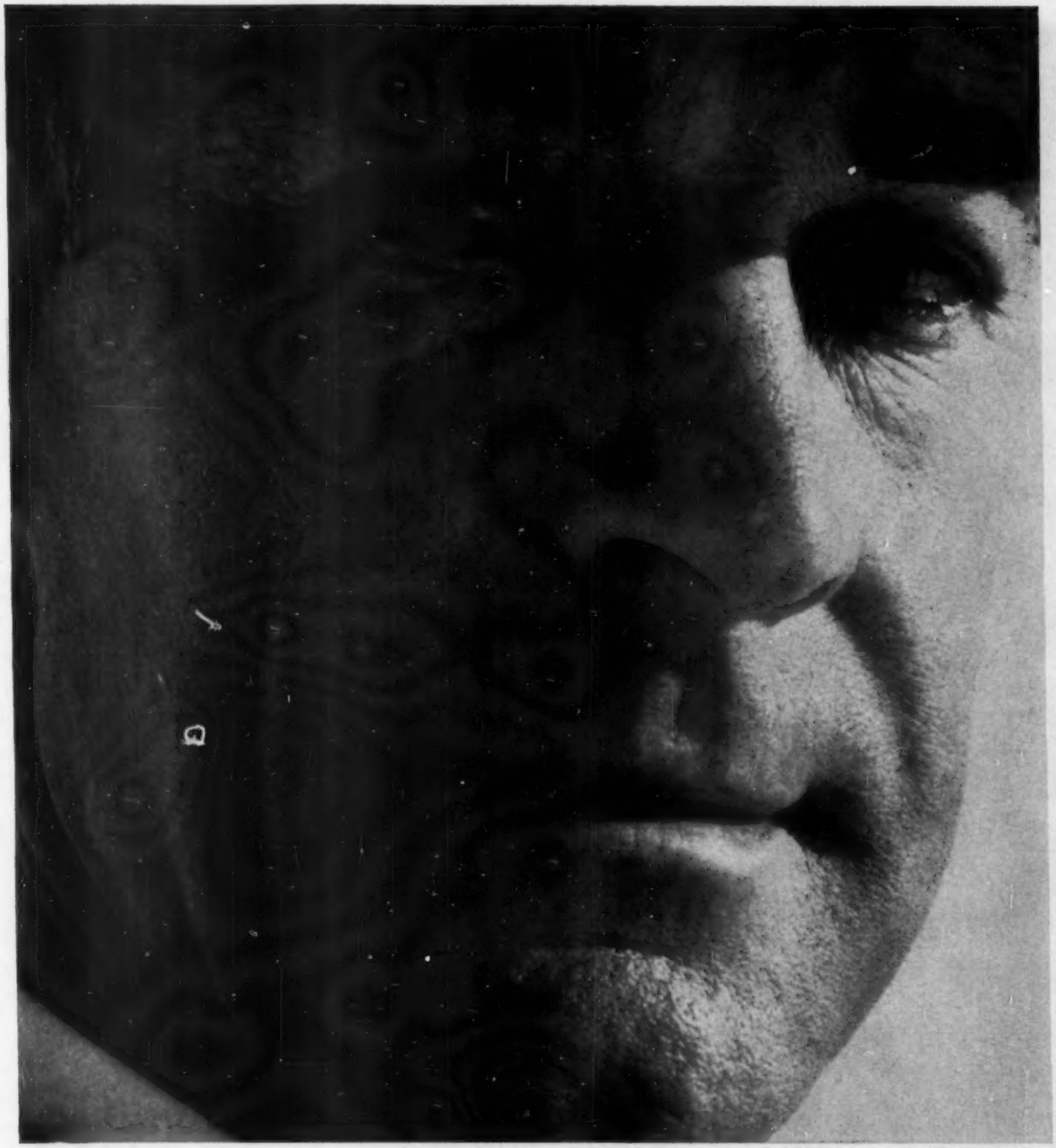

When your process calls for chemicals talk to the man from Dow

YOU CAN DEPEND ON DOW FOR: XANTHATES • DOWFROTH® 250 • Z®-200 • SEPARAN 2610® • HYDROCHLORIC ACID • AMMONIA • CHLORINE CAUSTIC SODA • VERSENE® • MAGNESIUM OXIDE • MAGNESIUM HYDROXIDE • ION EXCHANGE RESINS • SOLVENT EXTRACTANTS

THE DOW CHEMICAL COMPANY • MIDLAND, MICHIGAN

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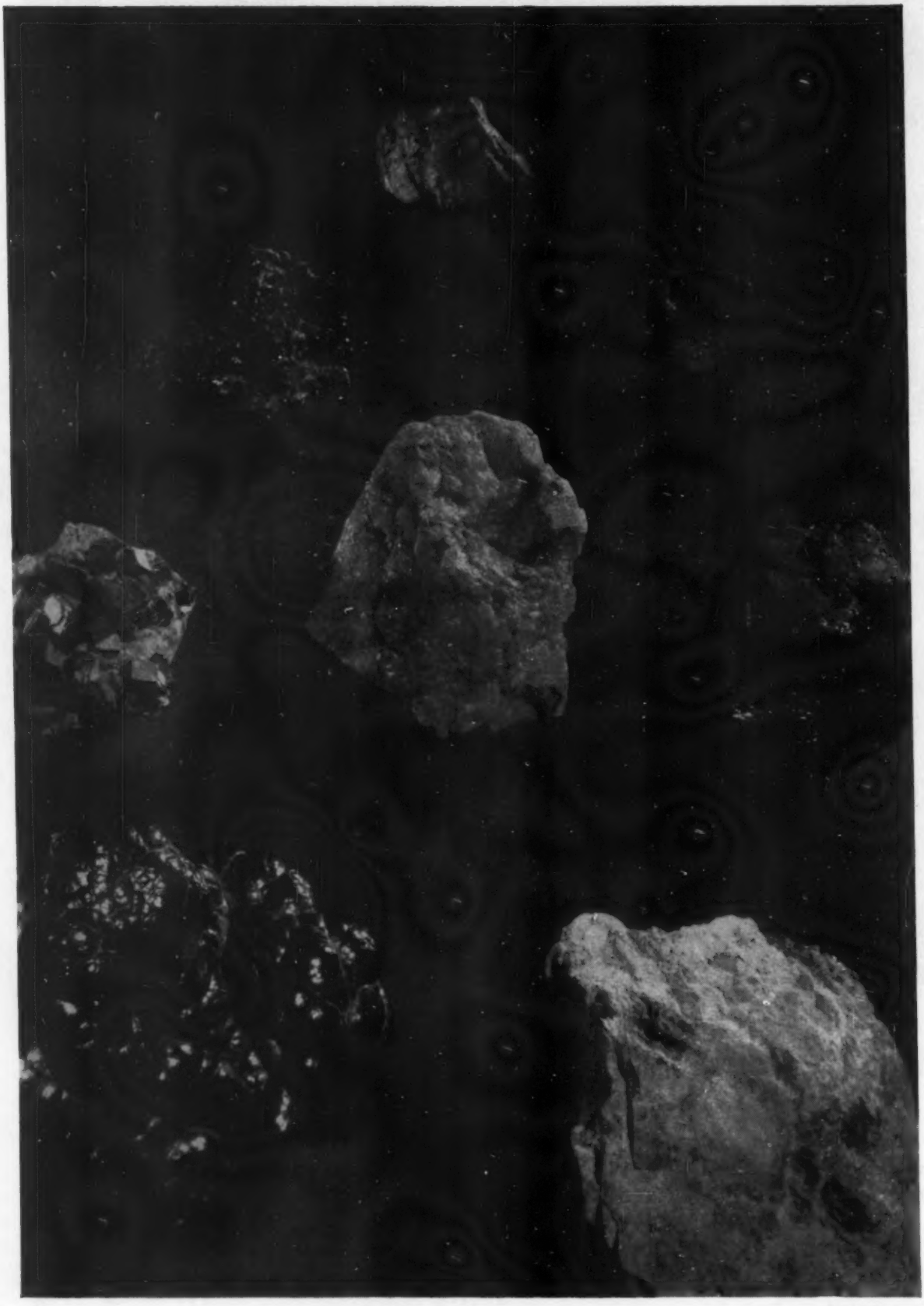

These represent a few of the minerals with which Separan 2610 is improving flocculation and lowering processing costs: CHROMITE, URANINITE, GALENA, SPHALARITE, CHALCOCITE, ALUMITE, COAL, HEMATITE.

For a wide variety of minerals Separan 2610 provides record-speed flocculation

NEW FLOCCULANT PROVES ITSELF IN NUMEROUS OPERATIONS

It's a fact—proven in many types of operations, with a wide variety of materials: Separan 2610® has doubled, and often tripled, production rates!

Equally remarkable: only a few hundredths of a pound are needed per ton of solids!

New economies are being realized in processing uranium, lead, and zinc, coal, copper, alum, and a host of other sulfide and non-sulfide minerals. Operations involving concentration, leaching, thickening, and refining are benefiting with Separan 2610, especially since this revolutionary flocculant is so easy to prepare and apply. A mechanical mixer is not required. You can prepare large amounts of stock solution with a new dispenser recently made available. And Separan 2610 is effective in both acid and alkaline circuits. In addition, it adds no excess bulk.

Try Separan 2610 yourself!

Available from three f.o.b. points: Midland, Michigan; Pittsburg, California; and Velasco, Texas . . . and from two stock points: Port Newark, New Jersey, and St. Louis, Missouri. A sample and technical assistance are yours upon request. THE DOW CHEMICAL COMPANY, Technical Service and Development, Midland, Michigan, Dept. SE1315C-1.

When your process calls for chemicals, talk to the man from Dow

XANTHATES • DOWFROTH® 250 • Z®-200 SEPARAN 2610 • HYDROCHLORIC ACID AMMONIA • CHLORINE • CAUSTIC SODA VERSENE® • MAGNESIUM OXIDE MAGNESIUM HYDROXIDE • ION EXCHANGE RESINS AND SOLVENT EXTRACTANTS.

HERE ARE EXAMPLES of how little Separan 2610 is required: In thickening copper tailings, clearer overheads and better filtration are reported with only 0.0041 pounds per ton of solids. Similar improvements are taking place in uranium filtration at 0.5 pounds per ton.

YOU CAN DEPEND ON DOW

LIMA

There's a quality-built LIMA to fit every mining job

You get down to pay dirt faster when you have power-packed Limas digging for you. Limas are rugged machines designed to master the toughest digging jobs . . . they strip away overburden fast in big, profitable bites . . . they get coal and ore loaded fast. Built in sizes from ½ to 6-cu. yds., there is a Lima matched to your mining operation.

These quality features are built into job-matched Limas!

air-controlled clutches on the larger types for ease of control and instant response.

anti-friction bearings in the drums and other critical parts to keep wear at a minimum and lessen lubrication problems.

dirt seals and retainers in crawlers exclude abrasive material.

torque converter drive (optional) for greater power without stalling.

big-capacity drums for longer cable life.

And, remember, wherever you are, you can depend on skilled service and nearby service stocks of parts to keep downtime to a minimum. See your Lima distributor for complete information about the machine best fitted to your needs . . . or write Construction Equipment Division, Baldwin-Lima-Hamilton Corporation, Lima, Ohio.

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Construction Equipment Division—LIMA WORKS

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Lima Type 34 Paymaster Dragline working in lead and zinc tailings near Wallace, Idaho. Machine has 45-ft. boom.

Lima Type 1201 Shovel stripping overburden in iron ore operation near Kinney, Minn. Machine is equipped with 32½-ft. boom, 22-ft. dipper handle, and 3-cu. yd. dipper.

Lima Type 2400 High Lift Shovel with 60-ft. boom, 45-ft. dipper handle, and 4½-cu. yd. dipper, mining coal near Holloway, Ohio.

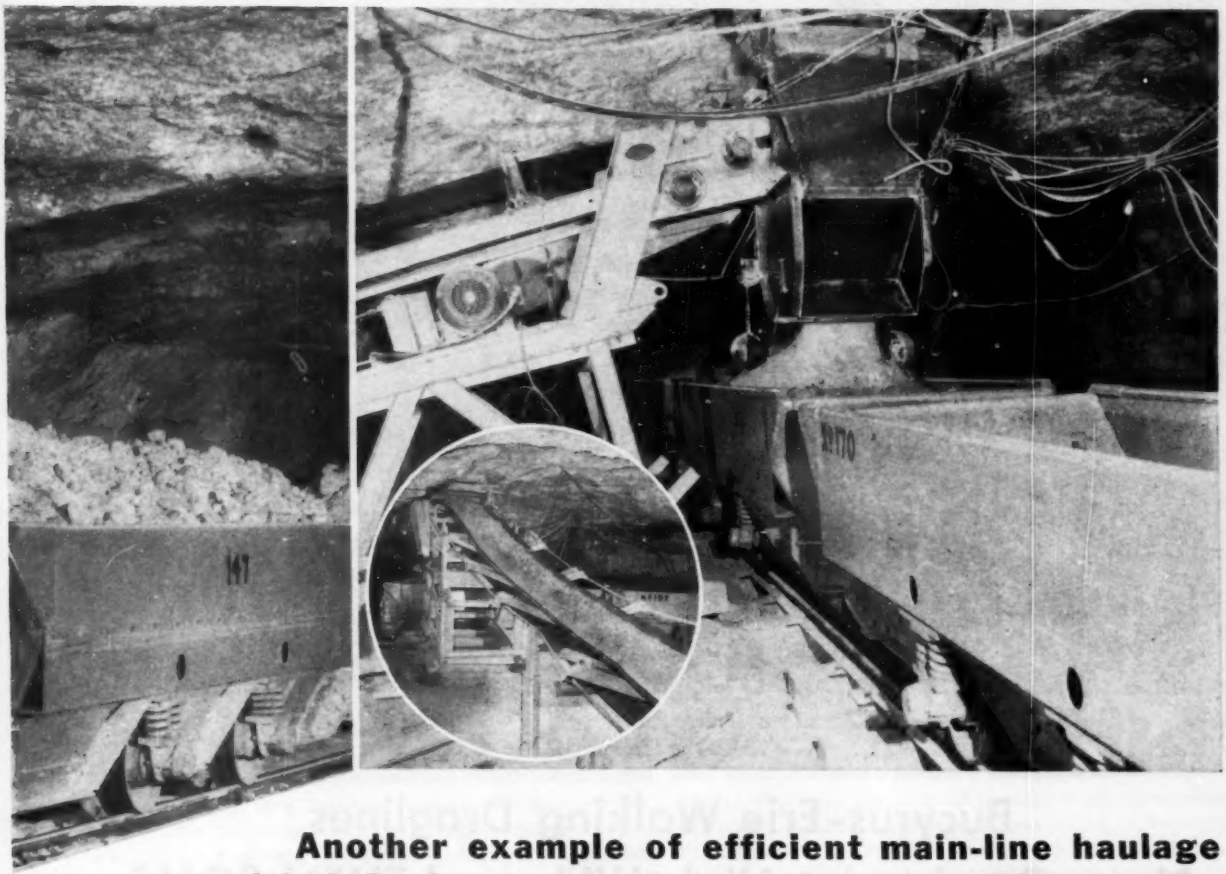
These S-D AUTOMATICS

SANFORD-DAY

Knoxville, Tennessee

"SUPER MARKET FOR MINE CARS" — *all types* * PRECISION WHEELS * "BROWNIE" HOISTS, CAR RETARDERS, SPOTTERS, PUMPS AND OIL SPRAY SYSTEMS * GISMO SELF-LOADING TRANSPORT that loads *(mucks)* in development or production . . . transports . . . supports 2 to 5 jib mounted drills . . . back fills . . . moves boulder rocks . . . makes its own roadways and cleans up completely — a new method of hard rock mining offering a tremendous reduction in cost per ton!

have been in service at U. S. Potash 3 years...working 363 days per year, two shifts per day on a seven-mile run!

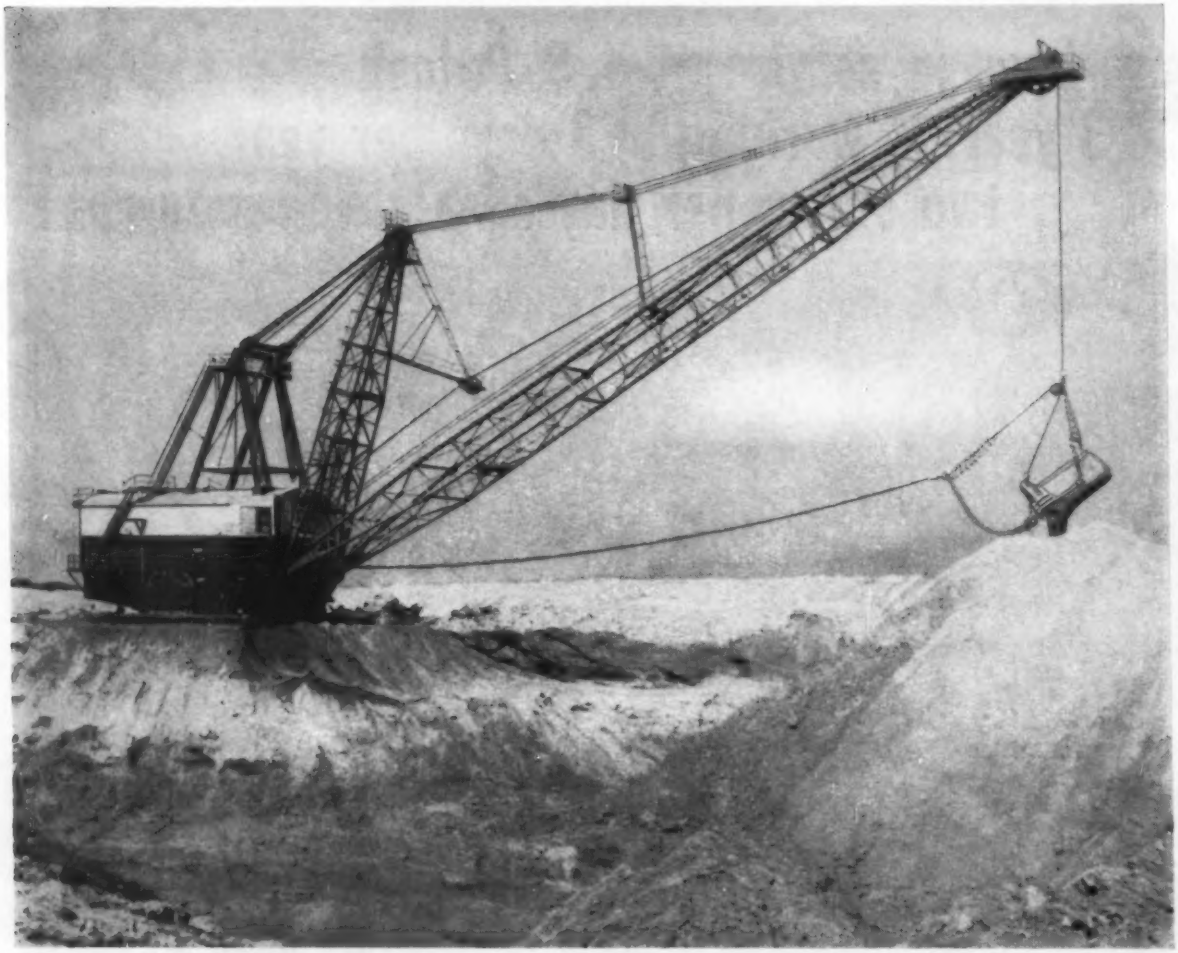


Another example of efficient main-line haulage with S-D "Automatic" Bottom Dumping Mine Cars!

"Because of their low center of gravity and balanced rugged construction, they hold the track exceptionally well at speeds up to 30-miles-per-hour," reports Mr. Earl H. Miller, resident manager of the Carlsbad, N. M., mining operation of United States Potash Company, Division of United States Borax & Chemical Corporation.

"Also," Mr. Miller continues, "the door operation is very good, allowing the cars to do a good job of self-cleaning." How does the maintenance costs of these cars compare with conventional type ore cars? "We have had very low maintenance costs on the S-D 'Automatics' compared to others we are using."

Note in pictures above and on page at left that mining management at U. S. Potash have further mechanized their main-line haulage with an automatic loading station. We are understandably proud that S-D "Automatics" were chosen for this U. S. Potash operation that incorporates the latest developments in modern simplicity and efficiency. In addition to this installation, S-D "Automatics," like the car illustrated at right, are hauling hard rock in several western mines at tremendous savings! Write us today for complete information. *Sanford-Day Iron Works, Inc., Knoxville, Tennessee*



This Bucyrus-Erie 770-B walking dragline is mining phosphate matrix near Bartow, Florida. It swings a 20-cu. yd. bucket on a 195-ft. boom.

Bucyrus-Erie Walking Draglines Move Overburden High, Wide and THEN SOME

Not only do Bucyrus-Erie walking draglines move overburden *high* to the top of spoil piles, but they go down deep for it, too, when necessary. And in addition to moving it high and wide, they traditionally move it *economically*. This ability to move big yardages at consistently low cost has made them preferred for stripping operations everywhere.

Modern front-end design that combines great strength with light weight contributes to outstanding performance—by permitting Bucyrus-Erie walking draglines to swing big buckets on long booms.

Exclusive Bucyrus-Erie walking mechanism permits smooth, fast moveups, easy maneuvering to most advantageous working position. These features plus month-after-month dependability and low maintenance are your assurance of high volume, economical production.

For moving big yardages economically, choose from the world's largest selection of walking draglines. Contact Bucyrus-Erie Company for full information. 142157

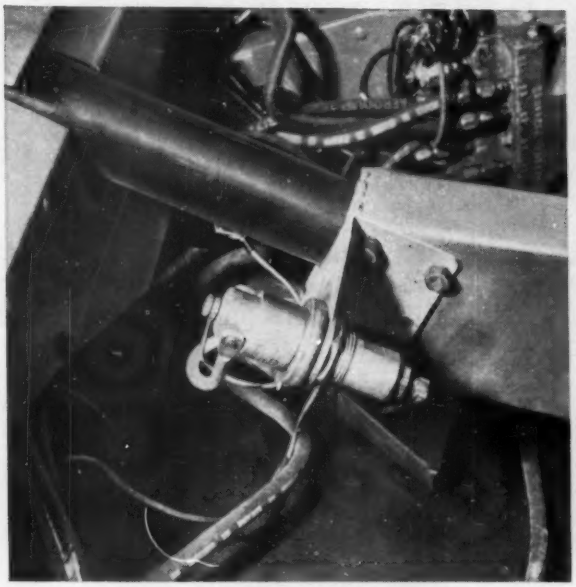
BUCYRUS ERIE

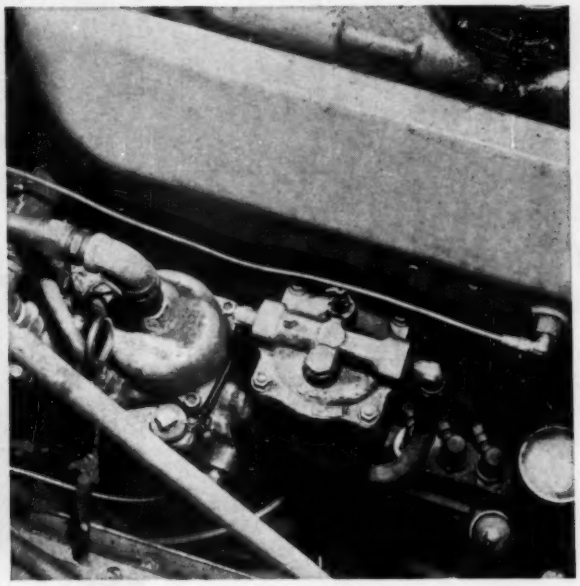
SOUTH MILWAUKEE, WISCONSIN,

The Engineer's Field Report

CASE HISTORY
PRODUCT Chevron Pressure Primer System
FIRM Consolidated Freightways Inc., Portland, Oregon

Pressure Primer System starts diesels on 1st or 2nd turn with regular batteries—at minus 40°





BELOW ZERO starting temperatures are common 5 months a year for Consolidated Freightways equipment operating in Mountain and Plain States. Two hundred and forty-four of the company's tractors are equipped with the Chevron Pressure Primer System. Since this installation, rigs start on first or second turn at 40° below zero—using regular equipment batteries! Normally in these sub-zero temperatures, regular batteries give out after about 4 turns. Sure starts plus the fact engines are primed with Chevron Pressure Primer bulbs, controlled from within the cab, saves Consolidated Freightways important man-hours and speeds operating schedules. Picture above (left) shows a Chevron Pressure Primer Discharger mounted on steering column. Highly volatile priming fuel is atomized through tubing into manifold (right) under 250 lbs. pressure.

FREE FOLDER tells you more about Chevron Pressure Primer System and how to install it on different engines. Write or ask for it today.

FOR MORE INFORMATION about this or other petroleum products of any kind, or the name of your nearest distributor, write or call any of the companies listed below.

CHEVRON

TRADEMARK "CHEVRON" AND CHEVRON DESIGN REG. U.S. PAT. OFF.

Why Chevron Pressure Primer System helps starting

Volatile Chevron Priming Fuel atomizes in induction system at temperatures as low as −65°F. Pressure or weakest spark from engine fires mixture.

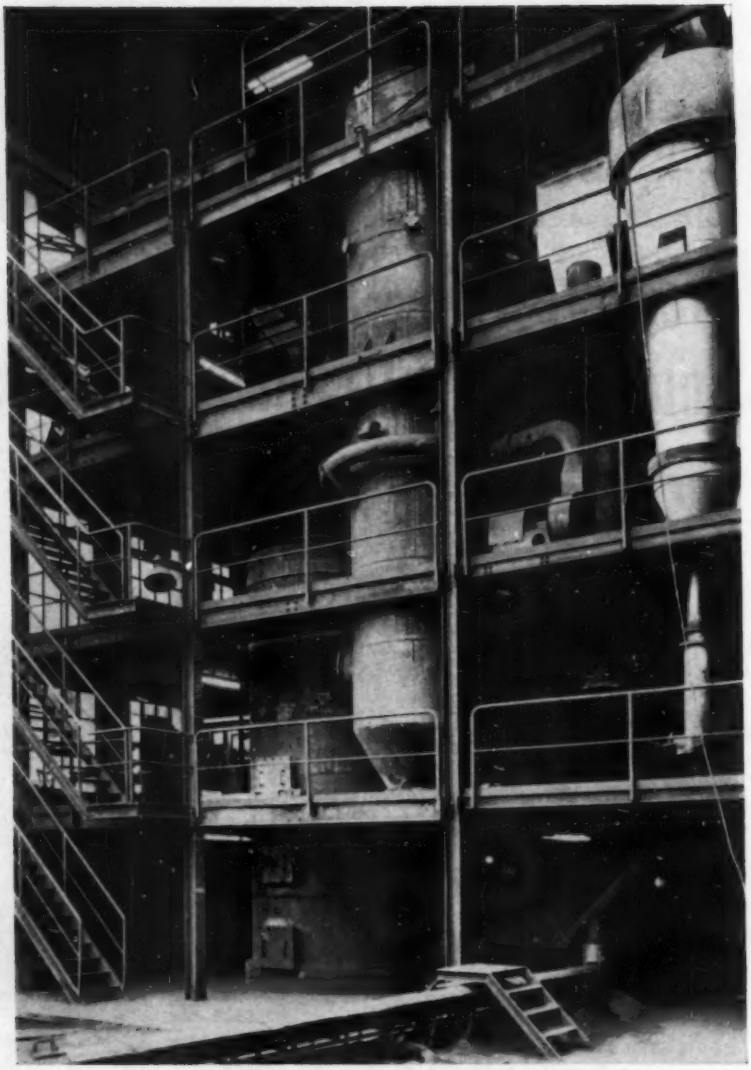
Simple, rugged discharger prevents fuel leakage. Small, safe steel bulbs protect fuel from water and dirt.

STANDARD OIL COMPANY OF CALIFORNIA, 225 Bush Street • San Francisco 20, California

THE CALIFORNIA COMPANY, P. O. Box 780 • Denver 1, Colorado

STANDARD OIL COMPANY OF TEXAS P. O. Box 862 • El Paso, Texas

fluidized techniques for SO_2 production in West Germany



The first installation in Germany of a Dorrco FluoSolids system for the production of SO_2 gas from pyrites recently went on stream in a large chemical plant. Main component of the system is the 7-foot diameter Dorrco FluoSolids Reactor in which 36 tons per day of pyrite containing 43% Sulfur is roasted at 900°C, delivering 10,000 CFM of SO_2 gas for the manufacture of 50 tons per day of 98% H_2SO_4.

Today, commercial applications of the Dorrco FluoSolids system for pyrite and pyrrhotites roasting total 52 reactors in 33 installations located in 12 countries. These units cumulatively produce the SO_2 gas necessary for the manufacture of over 5,000 tons per day of sulfuric acid . . . dramatic evidence of the world-wide acceptance of this most significant advance in roasting techniques in the last 35 years.

If there is a step in your flowsheet where intimate contact between solids and gases is essential, fluidization should be investigated. Dorr-Oliver research, design and engineering staffs in collaboration with our associated companies and representatives throughout the world can work to your advantage.

For complete information write Dorr-Oliver Incorporated, Stamford, Connecticut.

Dorrco and FluoSolids are Trademarks of Dorr-Oliver Inc., Reg. U. S. Pat. Off.

DORR-OLIVER
INCORPORATED
WORLD-WIDE RESEARCH • ENGINEERING • EQUIPMENT
STAMFORD • CONNECTICUT • U. S. A.

J. L. BEDENBAUGH HAS CAT DIESEL POWER BECAUSE HE CAN'T AFFORD DOWN TIME

That's a good vein of fuller's earth being mined near Quincy, Fla., by the Model 85 Northwest dragline shown above. Production is a profitable 4,000 tons per month, not counting all the overburden which is removed.

However, J. L. Bedenbaugh, the contractor, has one big problem. He just can't afford down time. He has no standby dragline to make sure production keeps up if this one doesn't operate. But he's found the best possible answer to that problem: a 225 HP (maximum output capacity) Caterpillar D342 Diesel Engine.

Mr. Bedenbaugh decided on CAT* Diesel power after careful study. When his former engine wore out, he talked to contractors in his area. He observed the dependability of Cat-built equipment owned by other users.

Has it worked out just as well for him? Here's his answer: "The D342 runs 15 hours a day, 6 days a week with no down time. I like it so well I've ordered a new Caterpillar D7 Tractor."

Modern heavy-duty Caterpillar units, ranging in size up to 650 HP (maximum output capacity), are available as original or replacement power for excavators, hoists, crushers and other equipment. They require practically no attention. Their fuel systems require no adjusting. And Caterpillar's single-orifice fuel injection valves with the precombustion chambers permit the use of such low-cost fuels as No. 2 furnace oil without fouling.

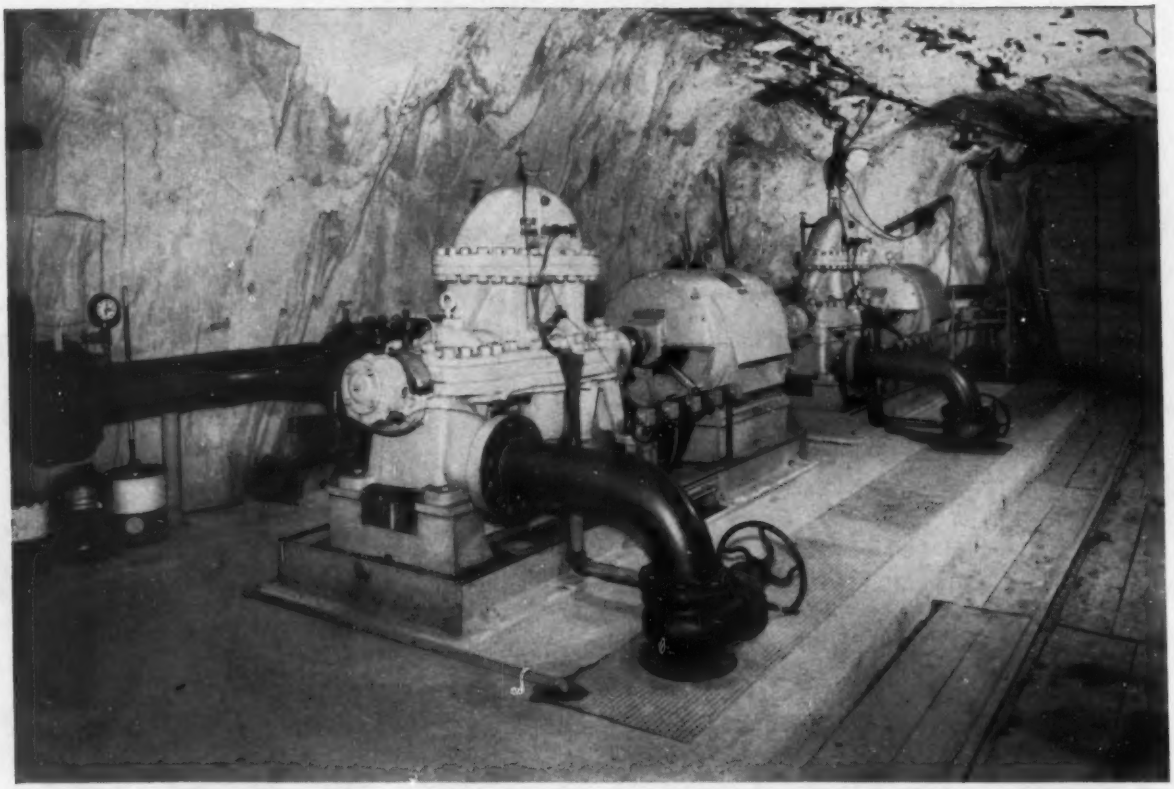
Today, these honestly-rated engines come from the Caterpillar plant bearing a signed, notarized certificate covering their power capabilities. Talk it over with your Caterpillar Dealer and discover which *certified* Caterpillar Diesel Engine is best for your needs. After you buy, look to him for prompt service and parts you can trust.

Caterpillar Tractor Co., San Francisco, Cal.; Peoria, Ill., U.S.A.

CATERPILLAR*

*Caterpillar and Cat are Registered Trademarks of Caterpillar Tractor Co.

Ingersoll-Rand Mine Pumps



Two 6-stage Ingersoll-Rand drainage pumps in the Star Mine at Burke, Idaho. Other I-R pumps in this mine include two 300 hp and two 250 hp multi-stage units, as well as numerous Motorpumps.

...meet exacting demands of drainage service at Star Mine of Bunker Hill Company, operated by Hecla Mining Co.

Installed on the 4000 ft. level of the Star Mine at Burke, Idaho, the two I-R pumps shown above boost water to the 2000 ft. or drainage level of the mine. Driven by 700 hp motors and rated at 1000 gpm each, 2050 ft. head, these units have been giving excellent service.

In the Coeur d'Alene mining area, in which the Star Mine is located, the traditionally fine performance of Ingersoll-Rand mine pumps has resulted in their selection for handling more than 95% of the mine water pumped. The exceptional service record of these units reflects Ingersoll-Rand's many years experience in the design, construction and application of pumps for mine drainage service.

Discuss your next pumping application with your nearby I-R representative. He is qualified to furnish complete information and recommendations.

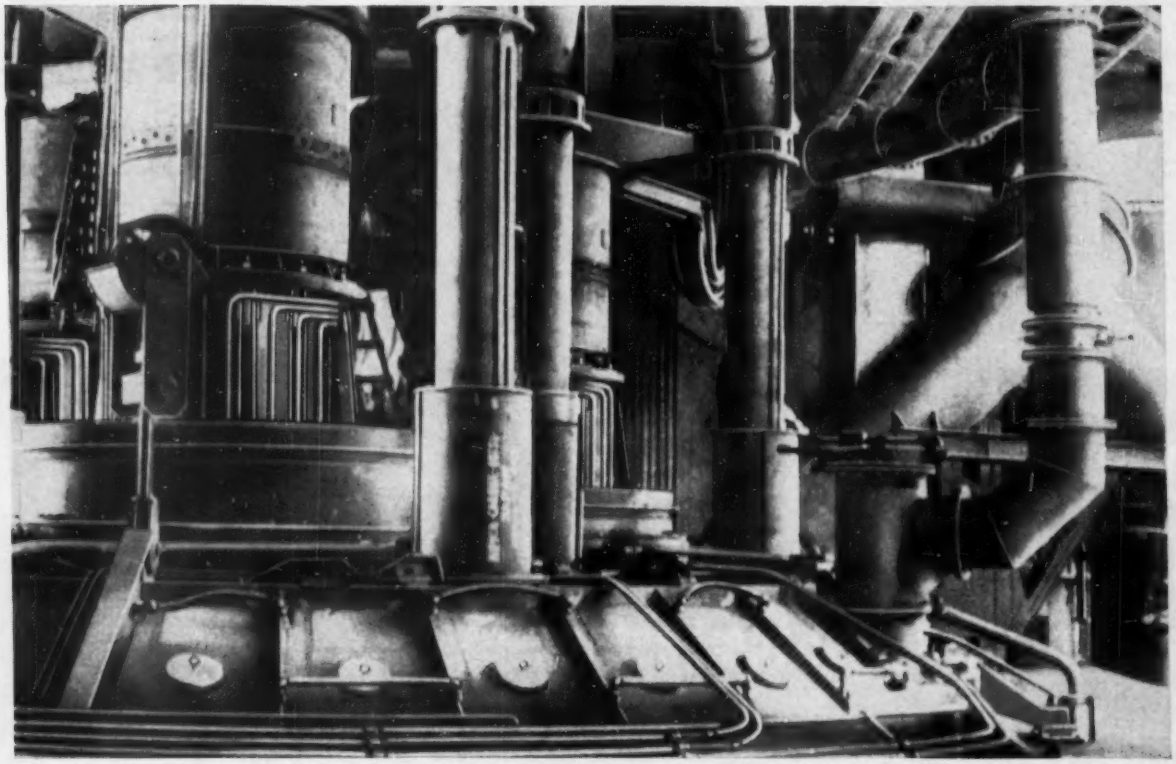
Ingersoll-Rand

10-362 11 BROADWAY, NEW YORK 4, N. Y.

COMPRESSORS • GAS AND DIESEL ENGINES • ROCK DRILLS • PUMPS • TURBO-BLOWERS • AIR AND ELECTRIC TOOLS

98% gas recovery
from completely covered, sealed-so-tight

DEMAG ELECTRIC SMELTING FURNACES



THE *first* completely covered, tightly sealed smelting furnaces were developed by Demag . . . and the Demag design has *never been surpassed!*

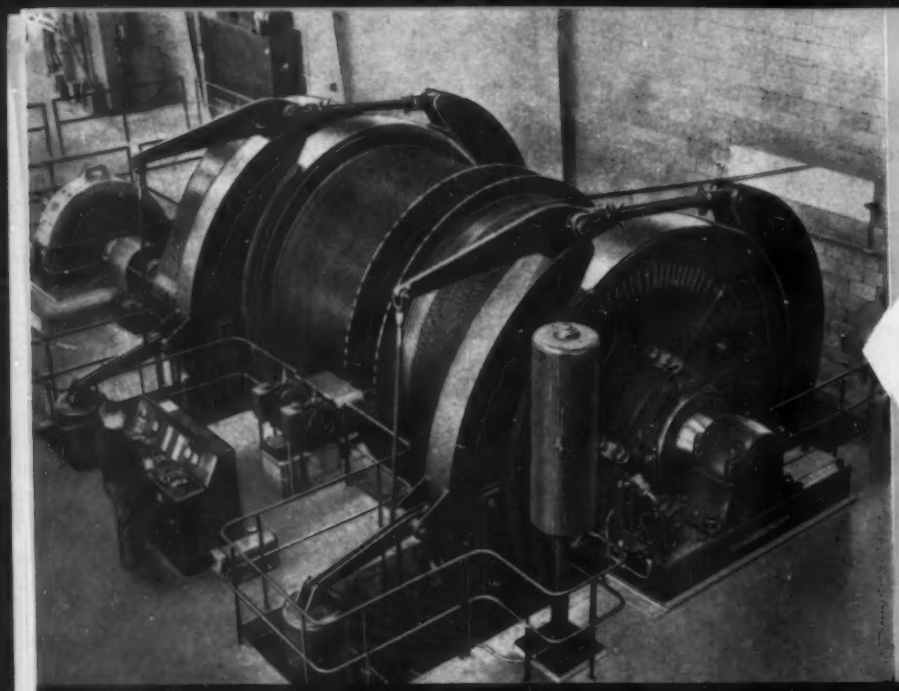
Gas-tight passage of movable electrodes through the roof forms a friction-free seal . . . so effective that 98% of valuable furnace gases are recovered. Roof lifting gear makes start-ups and inspection of interior furnace conditions easier. Retractable feed chutes regulate mix level of charge . . . furnace operates as efficiently at reduced as at full loading.

And now these and many other exclusive advantages of Demag design are available from Lectromelt . . . America's outstanding producer of electric furnaces. This unmatched Lectromelt-Demag combination of skills affords way-ahead efficiency, economy and safety in electric smelting furnaces.

For help in meeting any furnace requirement, contact Lectromelt Furnace Division, McGraw-Edison Company, 324 32nd Street, Pittsburgh 30, Pennsylvania.

Lectromelt*

*Reg. TM U.S. Pat. Off.



CONVENTIONAL DRUM HOISTS

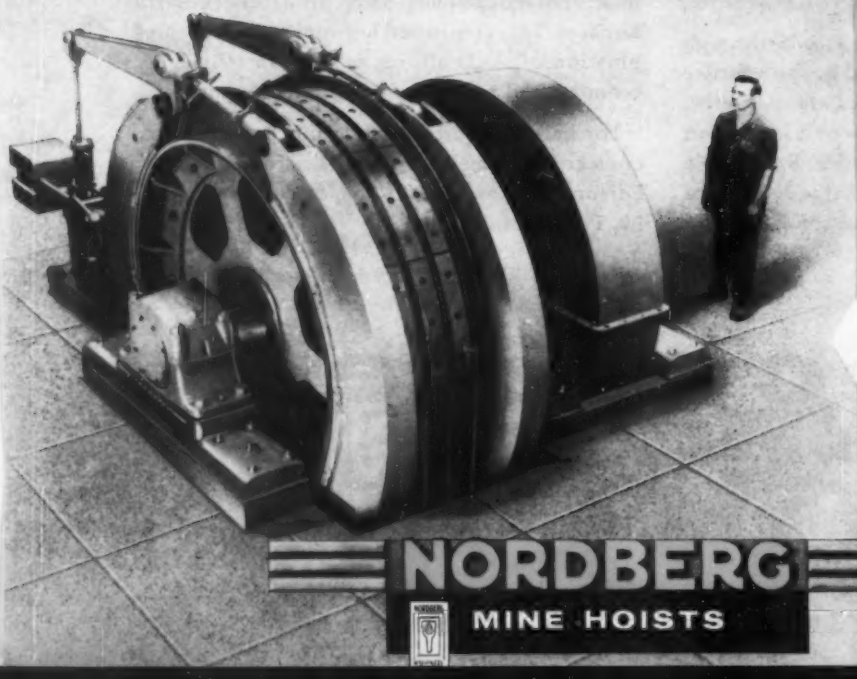
Typical of the large hoisting machinery built by Nordberg is this conventional 12′ diameter by 84″ face double drum ore hoist which serves a prominent iron producer. This hoist is designed for a depth of 2800 feet, using 10-ton skips and hoisting 14 long tons of ore at a rope speed of 2000 feet per minute.

Nordberg hoists are available for manual, push-button semi-automatic, or fully automatic control.

NORDBERG'S 61 YEARS of MINE HOIST EXPERIENCE can help you select the best hoist to meet your requirements

▶ Why not let over half a century of specialized mine hoist experience help you select the *right* type and size hoist to meet your specific operational requirements?

With the trend toward larger tonnages and more powerful hoists, greater emphasis must be placed on the proven experience and ability of the hoist manufacturer. Here, Nordberg has an established reputation second to none, and can furnish both conventional and friction type hoists. This wide experience is at the call of mine executives everywhere. *Consult Nordberg on your next hoist problem.*



FRICTION TYPE HOISTS

Where applicable, the hoisting of ore, men or materials can be economically handled with Nordberg Friction Hoists . . . built for either counterweighted skip or skips-in-balance operation. Manual, push-button semi-automatic, or fully automatic control available. Outstanding features of the Nordberg design include: One-piece welded steel drum; anti-friction roller bearings throughout; pressure applied—pressure released hydraulic brakes with emergency gravity application.

Illustrated is a 4-rope hoist designed for push-button semi-automatic, multi-level operation, to handle men and material.

NORDBERG
MINE HOISTS

NORDBERG MFG. CO.
Milwaukee 1, Wis.

MH157

We ship "as promised"...
in America's Largest Hopper-Car Fleet
another good reason

to specify

Your Westvaco® Soda Ash shipment is never held up by a shortage of hopper cars . . . because Westvaco has 300 covered hopper cars in customer service—by far the largest fleet of modern covered hopper-cars in the chemical industry.

Our modern rolling-stock hauls an extra-high quality product—free flowing, quick dissolving, low-iron, chemically-pure soda ash that saves plenty for users within our shipping area.

If you use ash, we should talk things over. We can probably offer you a bigger value for your money in Westvaco Soda Ash.

fmc® chemicals

Westvaco Chlor-Alkali Division
FOOD MACHINERY AND CHEMICAL CORPORATION

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BECCO peroxygen chemicals • FAIRFIELD pesticide compounds • FMC organic chemicals • NIAGARA insecticides, fungicides and industrial sulphur • OHIO-APEX plasticizers and resins • WESTVACO alkalis, solvents, phosphates, barium and magnesium chemicals

This operation cut production costs by teaming a six-yard shovel with Mack LVX's (rated capacity, 22½ tons). Powerful engines, increased efficiency of driver-engineered cabs, unmatched handling ease and maneuverability afforded by hydraulic steering and practical transmission ratios with torque converters, and many exclusive features, give Macks faster load-handling characteristics.

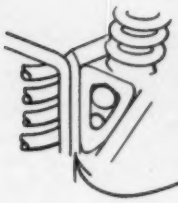
Tighter truck schedules reduce production costs

Today, many operators are cutting production costs by using larger shovels and fewer trucks making faster trips. This requires extra-capacity dumpers that are quicker, easier to handle, and rugged enough to withstand five- and six-pass loading—the kind of performance more and more operators find they can get from Mack off-highway dumpers (15- to 34-ton rated capacities).

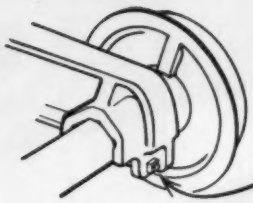
Why not contact your Mack representative for a look at these big Macks in action on a nearby job? When you see how quickly Macks move extra-capacity loads, how easily they can be spotted under shovels and at dumping sites . . . you'll understand why operators are teaming large-capacity Macks with bigger shovels to cut production costs. Mack Trucks, Inc., Plainfield, New Jersey. In Canada: Mack Trucks of Canada, Ltd.

MACK
first name for
TRUCKS

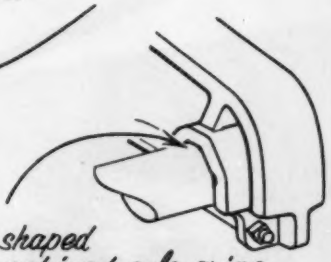
5335



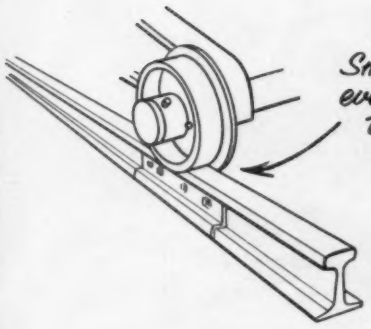
Movement between bolster and side frame is taken on specially designed wear surfaces



Quick wheel change

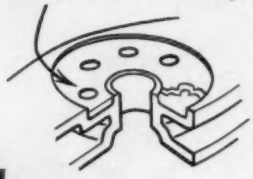


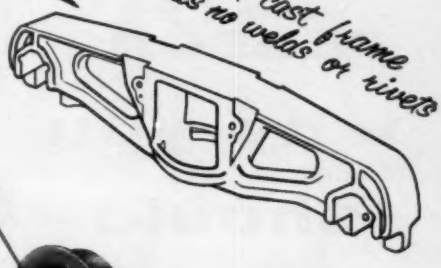
V-shaped machined axle grips for controlled flexibility and truck alignment



Smoother ride even on rough tracks

Large center bearing for longer life





Integral cast frame has no welds or rivers

Check these "plus" features

OF

NATIONAL NC-1 TRUCKS

If you're considering the purchase of new 8-wheel mine cars . . . or if you're thinking of modernizing older cars—*now* is the time to check the advantages of National NC-1 Trucks. National NC-1 Trucks have controlled flexibility for track variations yet still maintain truck alignment through their machined V-shaped axle grips. In addition, NC-1 Trucks have a built-in shock absorbing mechanism.

You get more out of your mine car investment per workshift . . . per day . . . per year. And at the same time you minimize spillage . . . get greater protection for your equipment, track and structures . . . slash maintenance to a new low.

Yes, *now* is the time to check National NC-1 Trucks—they make sense for 8-wheel mine cars . . . *make dollars for operators*, too.

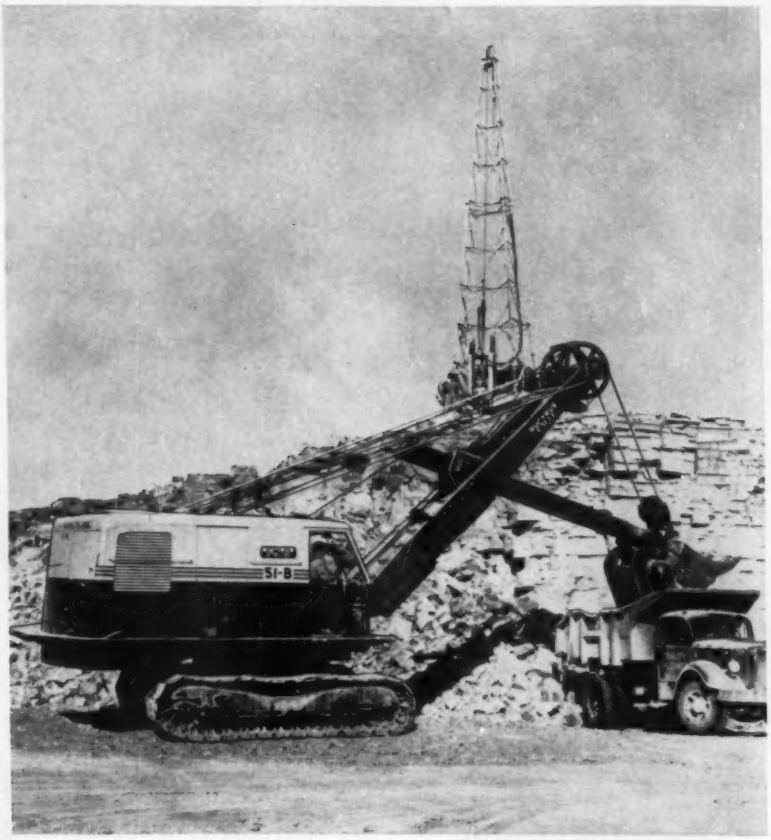
- WILLISON AUTOMATIC COUPLERS
- RUBBER CUSHIONED UNITS
- NC-1 CAR TRUCKS • NACO STEEL WHEELS
- NACO STEEL LINKS & SWIVEL HITCHINGS

AA-5077

NATIONAL MALLEABLE and STEEL CASTINGS COMPANY

Established 1868 — *Cleveland 6, Ohio*

3 BIG reasons why you should use



Allis-Chalmers Engines

They work day in, day out — season after season. Simplicity is a keynote of Allis-Chalmers design. For instance, diesel models have *30 to 50 percent fewer wearing parts than competitive engines!* Naturally, fewer parts mean less wear, less that can go wrong.

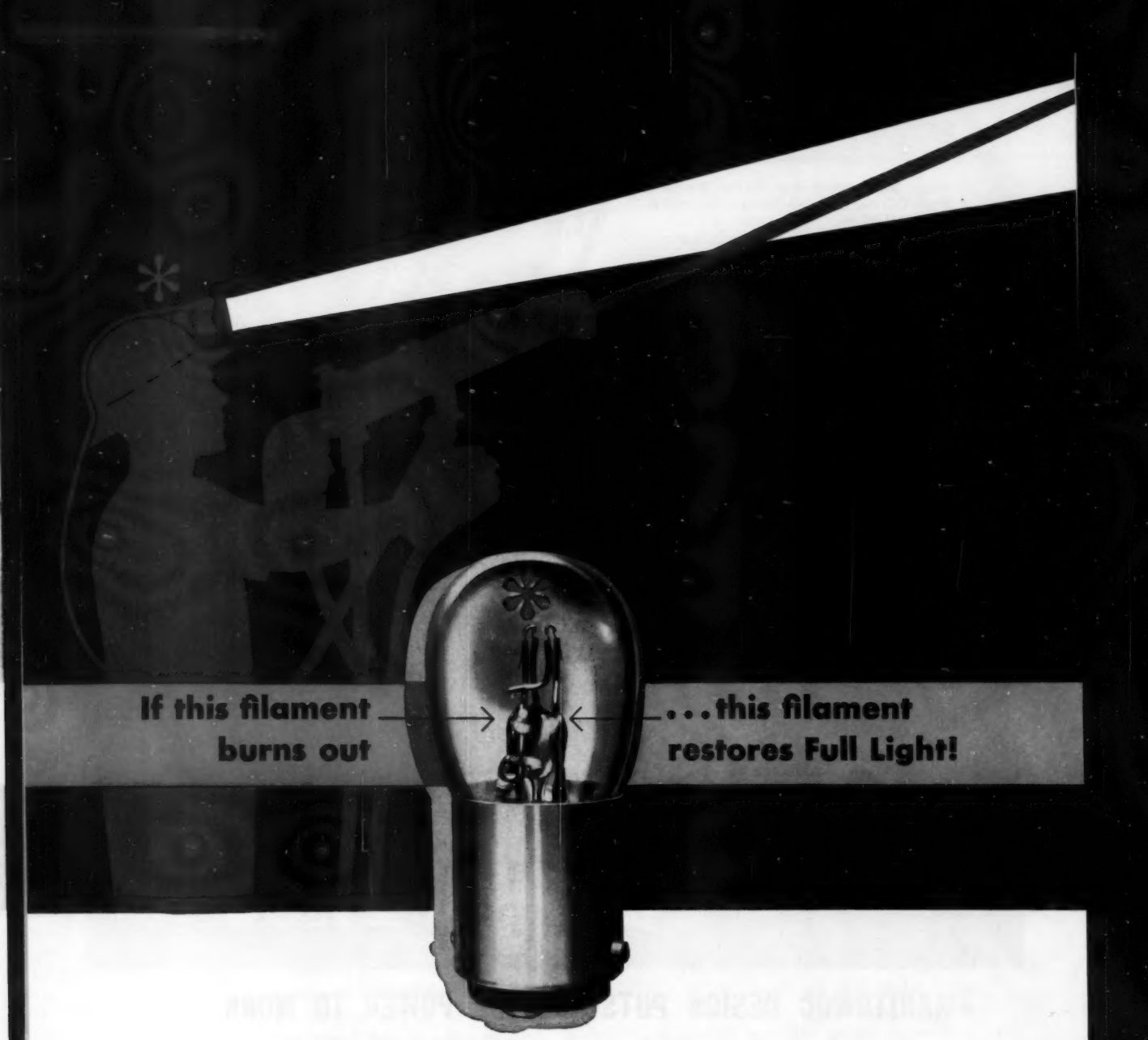
You enjoy 3-deep parts and service backing with practically "factory-town" service wherever you are! Allis-Chalmers' proven 3-deep dealer-branch-factory system means your dealer can obtain parts or factory-trained service help quickly from one of *18* strategically located factory branches.

There's an engine to EXACTLY fit your needs in the Allis-Chalmers complete line, 9 to 516 hp. Your choice of fuels, too — diesel, gasoline, natural or LP gas. See your Allis-Chalmers dealer, or write for complete information.

ALLIS-CHALMERS, BUDA DIVISION, MILWAUKEE 1, WISCONSIN

ALLIS-CHALMERS

BC-5A



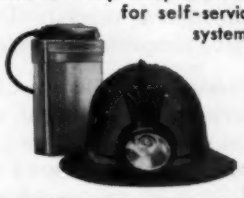
Man-hour protection for working crews . . . the Edison R-4 double-filament bulb

Working crews are assured greater underground safety, more productive man-hours because the Edison R-4 double-filament bulb is on the job.

Miners equipped with this bulb know that burn-out doesn't mean blackout. If one filament burns out, a turn of the switch transfers the power of the unfailing Edison battery to the second filament—continued, brilliant illumination is restored for the full shift. There's no lost time for the miner, or short crews for the foreman. There is only *one bulb*, located in the center of the headpiece, which gives the advantages of maximum reflector area.

This kind of reserve light protection means that hundreds of man-hours may be saved every year. The result is increased production with an added margin of safety. Our bulletin gives complete details. Write for your copy.

Edison R-4 Cap Lamp . . . ideal for self-service systems.



MSA
SAFETY EQUIPMENT HEADQUARTERS

When you have a safety problem, M-S-A is at your service . . . our job is to help you

MINE SAFETY APPLIANCES COMPANY
201 North Braddock Avenue, Pittsburgh 8, Pa.
At Your Service: 77 Branch Offices in the United States and Mexico

MINE SAFETY APPLIANCES CO. OF CANADA, LTD.
Toronto, Montreal, Calgary, Edmonton, Winnipeg, Vancouver, Sydney, N.S.

MANITOWOC DESIGN PUTS ALL THE POWER TO WORK

There's no wasted horsepower with a Manitowoc Model 4500. Intelligent design forethought has reduced power-robbing extra parts throughout this big capacity mining machine. In fact, there are only 15 gears and 8 sprockets! And *only working gears turn* . . . Manitowoc's exclusive slide pinion arrangement disconnects all others until their function is needed. Even many *small* excavators don't have simplicity of design like this!

Powered by a single diesel power package rather than a series of independent electric motors, the 4500 has the get up to go anyplace . . . unhampered by trailing electric power cables. There's no downtime due to the failure of delicate electric switches, control boards or miles of wires. Put more power to work in *your* mine with a fast digging, long reaching Manitowoc 4500 shovel or dragline. A call to your Manitowoc distributor will bring all the facts.

MANITOWOC ENGINEERING CORP. Manitowoc, Wis.

GREATER SPEED AND POWER—LESS DEAD WEIGHT

TRUE MOBILITY TO MAKE MINING PROFITABLE ANYWHERE

GREATER STABILITY PRODUCES FULL BUCKETS, LOWER GROUND PRESSURE

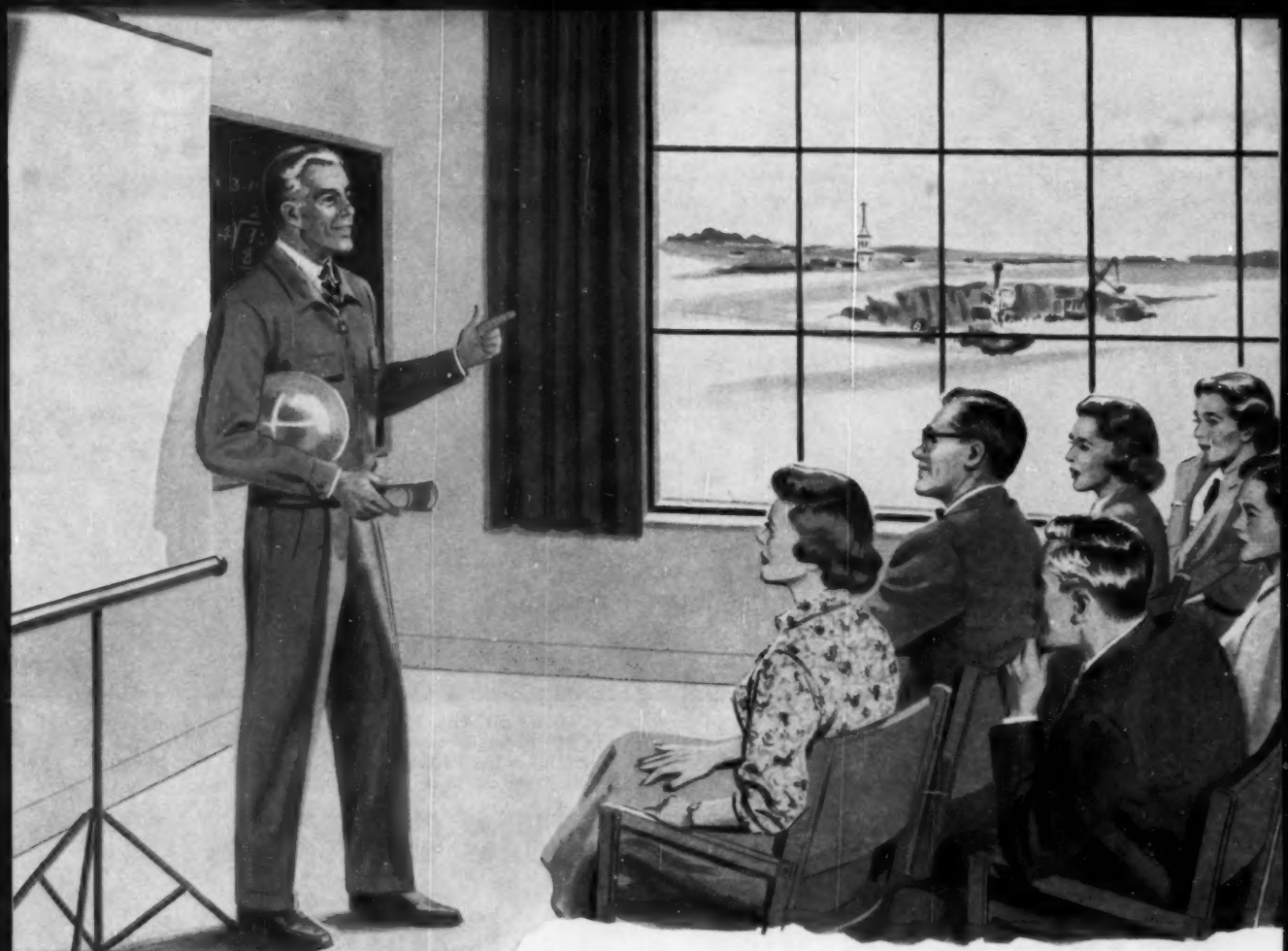
DRAG TRAVELS ANYPLACE WITH A LOW, LOW TRAVEL CLEARANCE OF ONLY 17' 2"

BONUS CAPACITY IN ANY MATERIAL—MANEUVERABILITY OF A SMALL MACHINE

SHOVELS 1 - 5½ YD.

Manitowoc

CRANES 20 - 100 TON



how to have friends—even though blasting

There's a new, effective way to aid your public relations in communities where you are blasting. It's the interesting, informative sound film, in color, entitled, "*We're Blasting Near You.*"

When you show this film to PTA meetings, service clubs and other civic organizations, you can prove that you're a good neighbor . . . that blasting, while necessary, is nothing for people to be alarmed about.

"*We're Blasting Near You*" shows how modern millisecond delay techniques eliminate old-fashioned, jarring explosions . . . how modern methods hold blasting noise to a muffled minimum, and make vibration unnoticeable. In a friendly, noncommercial way, the movie shows your efforts to be a good citizen in the community.

You can show this movie to any age group. It is accompanied by a kit containing news releases, sample speeches, safety posters and other helpful material which will make your public relations meeting a success. Write for available dates, and show "*We're Blasting Near You*" in your community!

Technical Customer Service Section

ATLAS POWDER COMPANY

WILMINGTON 99, DELAWARE

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Out of the pit with 18-tons of shovel-loaded limestone comes the "65" Payhauler owned by Lee Crawford Quarry Co., Cedar Rapids, Iowa. The 1,200-foot haul includes a 400-foot 15% grade. The "65" was chosen on competitive demonstration.

"65" Payhauler® beats two competitors on tough, 50-hour demonstration

—for Lee Crawford Quarry Co., Cedar Rapids, Iowa

Veteran quarryman Lee Crawford invited three makes of off-highway haulers to go into his pit and "roll up their sleeves." He wanted hauling that could match the crushing efficiency of his newly-equipped plant which is as nearly perfect as could be built.

One make of hauler could not match crusher capacity. Another kept the monkey wrenches busy. Winner of the 50-hour test: the International "65" Payhauler!

"Perfect Payhauler performance made our choice easy," states Plant Superintendent Kenneth Mercer. "The '65' hauled bigger loads easily up the 15% grade out of the pit. It dumped cleaner, and up to three times faster—and got away faster for shortest cycle time.

"With the '65' we have achieved our plant efficiency goal."

Try the exclusive high reverse and "zip-around" power steering—that give 18-ton "65" or 24-ton "95" regular pick-up truck spotting ease. Measure capacity-adding Payhauler get-away speed—and the fuel economy of its load-matched, turbo-charged diesel power. Measure super-fast Payhauler dumping speed. See your International Construction Equipment Distributor for a demonstration!

INTERNATIONAL® CONSTRUCTION EQUIPMENT

International Harvester Co., 180 N. Michigan Avenue, Chicago 1, Illinois

A COMPLETE POWER PACKAGE: Crawler and Wheel Tractors . . . Self-Propelled Scrapers . . . Crawler and Rubber-Tired Loaders . . . Off-Highway Haulers . . . Diesel and Carbureted Engines . . . Motor Trucks . . . Farm Tractors and Equipment.

International Harvester Company
180 North Michigan Ave.
Chicago 1, Illinois

Gentlemen: Please send me a free copy of the new, fully-illustrated Payhauler catalog (Form CR-603-G).

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CYANAMID

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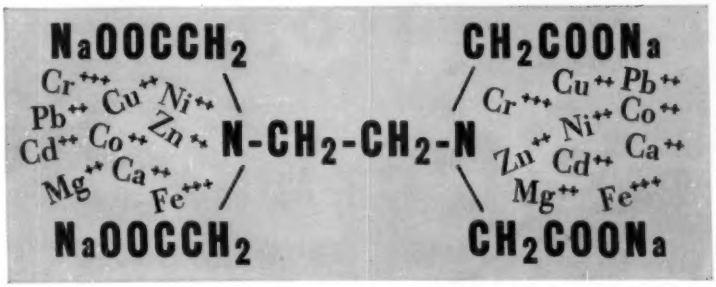
Useful New Cyanamid Reagent

CYQUEST* 40

Sequestering Agent



CYQUEST 40 is a powerful chelating agent uniquely effective in tieing up troublesome divalent and trivalent metallic ions. It has proven to be an extremely useful addition to the Cyanamid family of mining chemicals.

Cyanamid is basic in the production of this tetrasodium ethylenediamine tetracetate solution (40% strength). It is available in both 15 and 40-gallon liquipaks (polyethylene-lined reinforced fiber drums), steel drums and tank truck or tank car quantities at a price that makes your evaluation of it in the following areas a must:

Hydrometallurgy — chelate troublesome calcium and magnesium — preventing solid deposition, or removing scale

Flotation — particularly oxide flotation or areas where soluble salts are troublesome

Solvent Extraction — chelate interfering metal ions

Fractional Precipitation — chelated ions are soluble and unreactive

Write today for our comprehensive technical bulletin and a free sample.

AMERICAN CYANAMID COMPANY

MINING CHEMICALS DEPARTMENT

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Company_____

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☐ Send bulletin ☐ Send sample CYQUEST 40

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CYANAMID DE MEXICO, S. A.
Apartado No. 26012, Mexico 12, D. F., Mexico

CYANAMID OF GREAT BRITAIN LTD.
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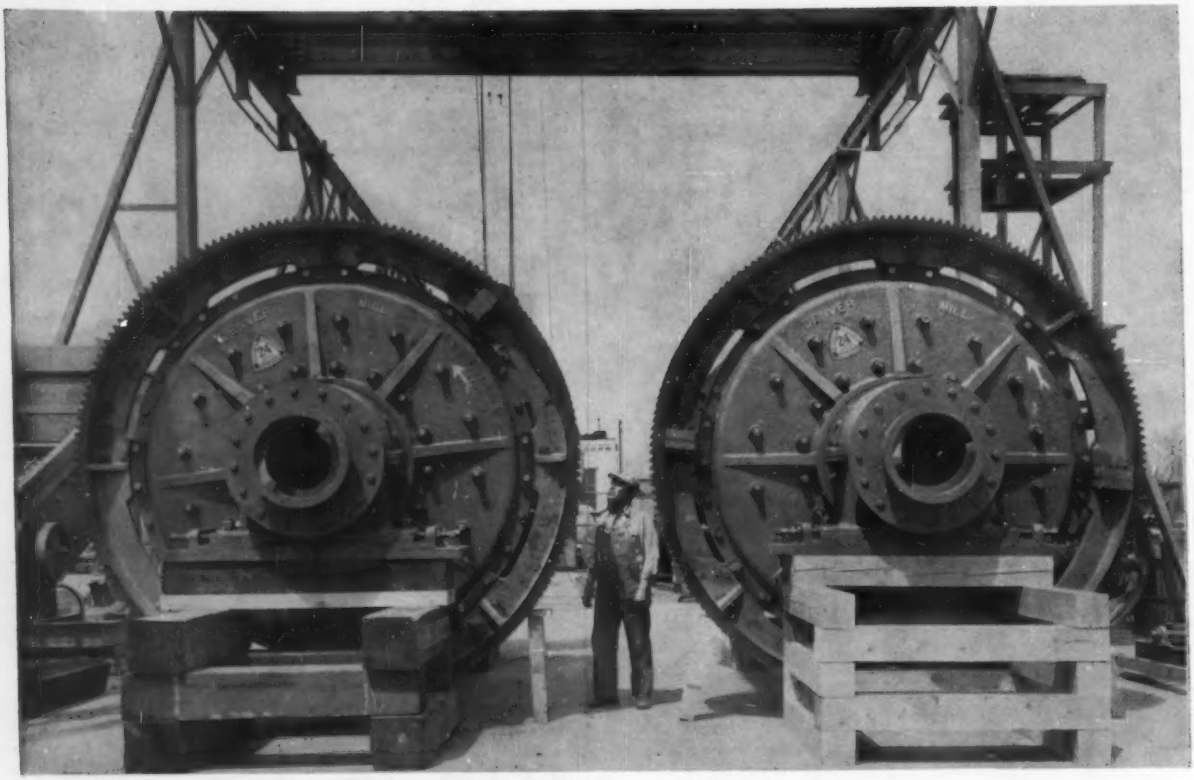


Part of the 76 MILLS
we have sold in the past 21 months

There MUST be a reason!

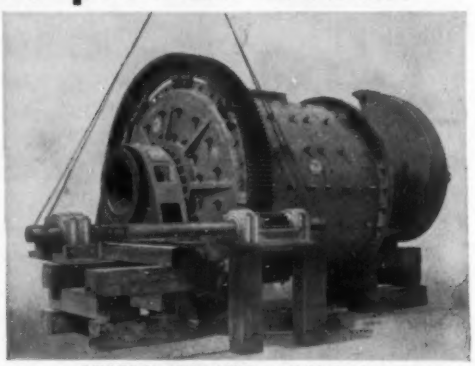
. . . and the reason is STEEL! DENVER MILLS have STEEL heads and STEEL shell. Steel is specified because you can depend on the strength of STEEL.

Cast iron heads do break. A cracked or broken mill head is expensive. The mill man who has experienced the high cost of lost production time due to a mill head breaking KNOWS you cannot afford to RISK cast iron!

Specify DENVER Steel-Head MILLS for dependability.

You pay no more for DENVER Steel-Head Mills. You will find this out when you compare specifications and price of DENVER Steel-Head Mills.

No matter what you call it, cast iron is still cast iron. Would you buy an automobile with a cast iron chassis?



DENVER Steel-Head Mills available in sizes up to 8′ diameter and up to 20′ long (all dimensions are inside liners). You will be proud of your DENVER Steel-Head Mill.

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Mining World

THE IMPORTANT MINING MAGAZINE EVERYWHERE

December 1957

INTERNATIONAL PANORAMA

INSPIRATION ARIZONA—The new molybdenum flotation circuit at Inspiration Consolidated Copper Company's mill here will be in operation early in 1958. It will be fifth Arizona copper mill to recover molybdenum.

JEFFREY CITY, WYOMING—Western Nuclear Corporation has paid $500,000 in cash on a $1,000,000 purchase price for 50 percent ownership in the 20 Frazier-Lamac uranium claims in the Gas Hills. WENCOR already owned 50 percent interest.

RICHMOND, VIRGINIA—Reynolds Metals Company has formed an Australian subsidiary, Reynolds Pacific Mines, Ltd., to prospect for bauxite in Australia with ultimate goal of establishing an integrated aluminum operation.

PORTHILL, IDAHO—The first shipment of thorite concentrates produced from ore mined in Idaho has been made by Northwest Prospecting and Development Company. Heretofore Idaho thorium has been in monazite concentrates from dredging.

ROUSES POINT, NEW YORK—Quebec Lithium Corporation will build a plant here to process lithium concentrates into lithium chemicals. Concentrates will be shipped to the plant from the firm's 1,000-ton-per-day mill near Val d'Or, Quebec.

SANTIAGO, CHILE—The Anaconda Company has started production from its Africana copper mine near here. The mine is operated by Anaconda's subsidiary, Santiago Mining Company.

COLADA, NEVADA—Mineral Materials Company is operating Nevada's first iron ore beneficiation plant at its mine in the Stillwater Range. The magnetic concentrator produce is shipped to Japanese and United States steel plants.

RUM JUNGLE, AUSTRALIA—United Uranium N. L. will build Australia's first solvent extraction plant to treat uranium ore. The company has pitchblende mines in the South Alligator River and Coronation Hill districts.

COLUMBUS, OHIO—A huge vein of uranium ore has been reported in Ohio by Laurance W. Huntington who claims he has developed a method for processing the ore economically.

BRUSSELS, BELGIUM—Societe Metallurgique de Hoboken expects to begin production of nickel-cobalt matte in 1960. The company also plans to install equipment to treat copper-cobalt matte.

SALT LAKE CITY, UTAH—Bear Creek Mining Company, Kennecott's domestic exploration subsidiary, is reported to have found iron-manganese ore in westward drifting from its Burgin shaft in the Tintic district.

BRISBANE, AUSTRALIA—Consolidated Zinc Corporation reportedly has been given an initial mining franchise over 2,000 miles of potential bauxite property provided it establishes a town and an initial treatment plant at Weipa on the west coast.

SAN FRANCISCO, CALIFORNIA—J. H. Pomeroy & Company Inc. will build a multi-million dollar railroad for North West Guiana Mining Company Ltd., under the direction of African Manganese Company (Mines Management) Ltd., to carry manganese ore from the upper reaches of Barima River in British Guiana to tidewater.

BOISE, IDAHO—J. R. Simplot Company will go ahead with plans for building a clay processing plant in the Bovill area of Latah County. Construction of the $750,000 to $1,000,000 plant is scheduled to start around June 1.

TRONDHEIM, NORWAY—Sulitjelma mines is building a new 800-ton-per-day differential flotation mill to treat complex copper-zinc-pyrite ores. The new mill will replace an older plant.

AVOCA, EIRE—The Saint Patrick Mining Company, Ltd. has shipped its first copper. The mine was reopened 18 months ago by a Canadian mining group.

WASHINGTON, D. C.—The United States Atomic Energy Commission has announced that "it is no longer in the interest of the government to expand production of uranium concentrates." Under existing milling contracts production will reach 15,000 annual tons of concentrate in 1959.

Union Pacific Invites Bids for Wyoming Spur

The Union Pacific Railroad Company has invited sealed bids from a select group of contractors to build a new iron ore railroad from Winton north to Atlantic City, Wyoming.

The new railroad is to be built at the request of Columbia-Geneva Steel Division of the United States Steel Corporation to serve its planned open-pit taconite mine and beneficiating plant near Atlantic City. Winton is at the end of a spur to serve coal mines north of Union Pacific's main line at Rock Springs, Taconite concentrate, and pellets when a pelletizing plant is built, will be shipped to Columbia-Geneva's blast furnaces at Provo, Utah over the new line.

The Morrison-Knudson Company, Utah Construction Company, and Peter Kiewitt and Sons have been invited to submit bids for grading and track laying to Union Pacific's head office at Omaha, Nebraska early in November.

The new line will be about 70 miles long, will require excavation of more than 1,000,000 cubic yards of rock, and when under construction will be the longest section of main line railroad being built in the United States. It will be, in fact, one of the longest lines built in recent years and in many respects is similar to the railroad lines built in Minnesota by Reserve Mining Company, and Erie Mining Company to transport taconite pellets from Mesabi Range plants to Great Lakes ports.

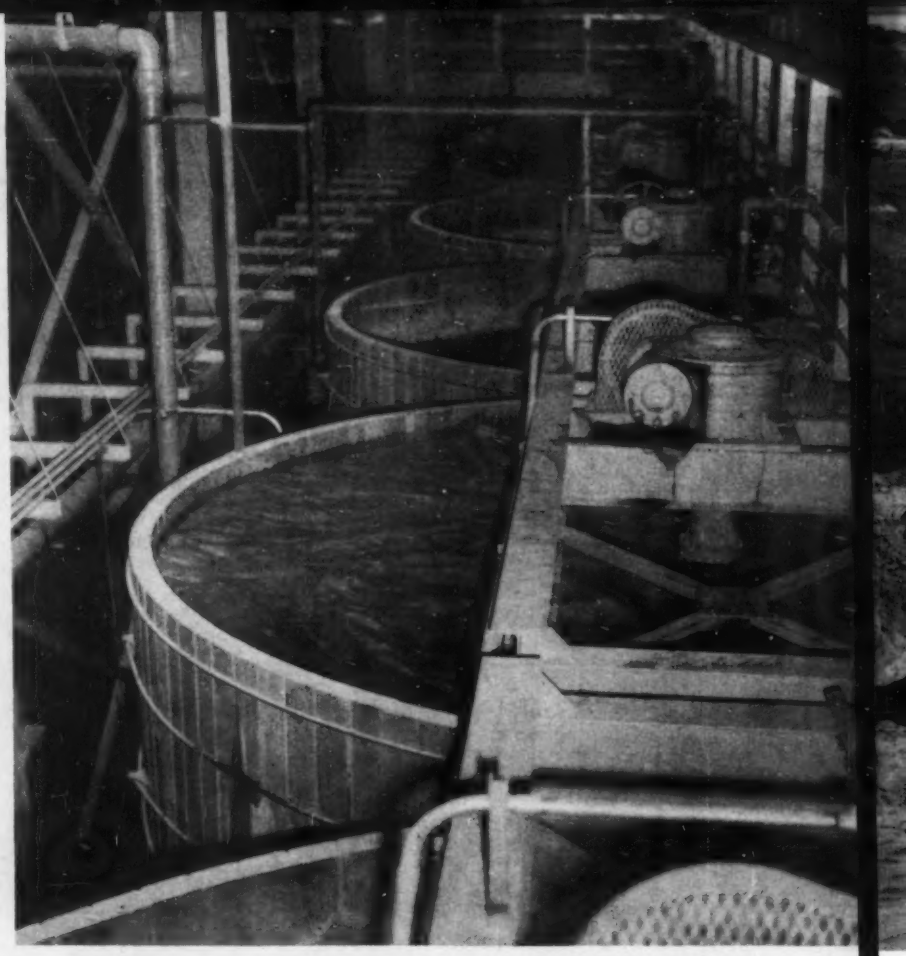
United Uranium Plans Ore Treatment Plant

Construction of a processing plant for uranium ore is planned by United Uranium N. L. in the area around the South Alligator River in the Northern Territory, Australia. A solvent extraction process will be used in the new plant and annual production of 300,000 tons of uranium oxide is anticipated.

Ore from El Sharana and other mines in the area will be treated at the plant. The company is currently negotiating for a contract with the United Kingdom Atomic Authority for the purchase of uranium ore from the South Alligator River area.

United Uranium's preliminary drilling in the Coronation Hill area has indicated reserves reported at 20,000 tons of payable ore. Further exploration is underway.

The long awaited government's brief in the gold test case for World War II gold mine closings was filed with the clerk of the United States Supreme Court on October 18. The claimant's brief will be filed within 30 days. Thus it appears that the case will be reached for hearing during January 1958.



YELLOW CAKE PRECIPITATION takes place in these Denver Equipment agitators. MgO is used for precipitation.

Wyoming Success Story:

First "Penny Stock" Company To Become

By GEORGE O. ARGALL, JR.
Editor

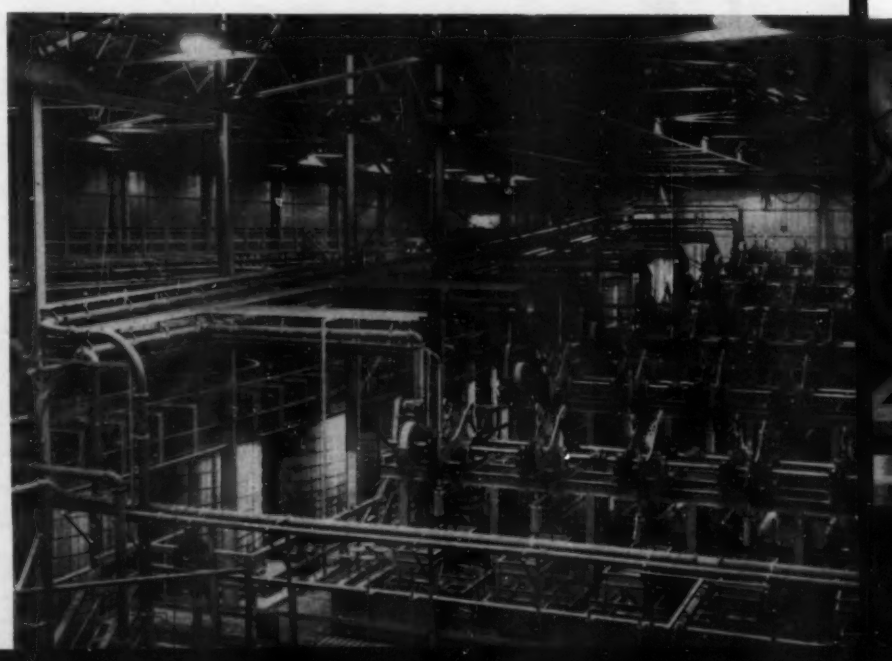
Not quite one in a million, but definitely the only one in a thousand is Western Nuclear Corporation. Yes, it is the only United States mining company to date that sold "penny uranium stock" and became a fully integrated uranium company. Just about 1,000 new uranium companies were formed from 1953 to date. In addition, scores of partnerships and other non corporate groups were formed to make money in uranium.

Western Nuclear (formerly Lost Creek Oil and Uranium Company) has the proud distinction of starting out with the dreams of its energetic president, Robert W. Adams, and fighting on through to ownership of substantial ore reserves in Wyoming's Gas Hills and Crooks Gap districts, a 440-ton-per-day uranium mill at the firm's newly built employees' city at nearby Jeffrey City, and still controls and manages the operations from raw prospect to finished yellow cake. An outstanding achievement when one remembers that other more widely publicized individuals and companies ended up selling, holding only a part ownership in a mill, or as a partner in new companies operated and managed by others.

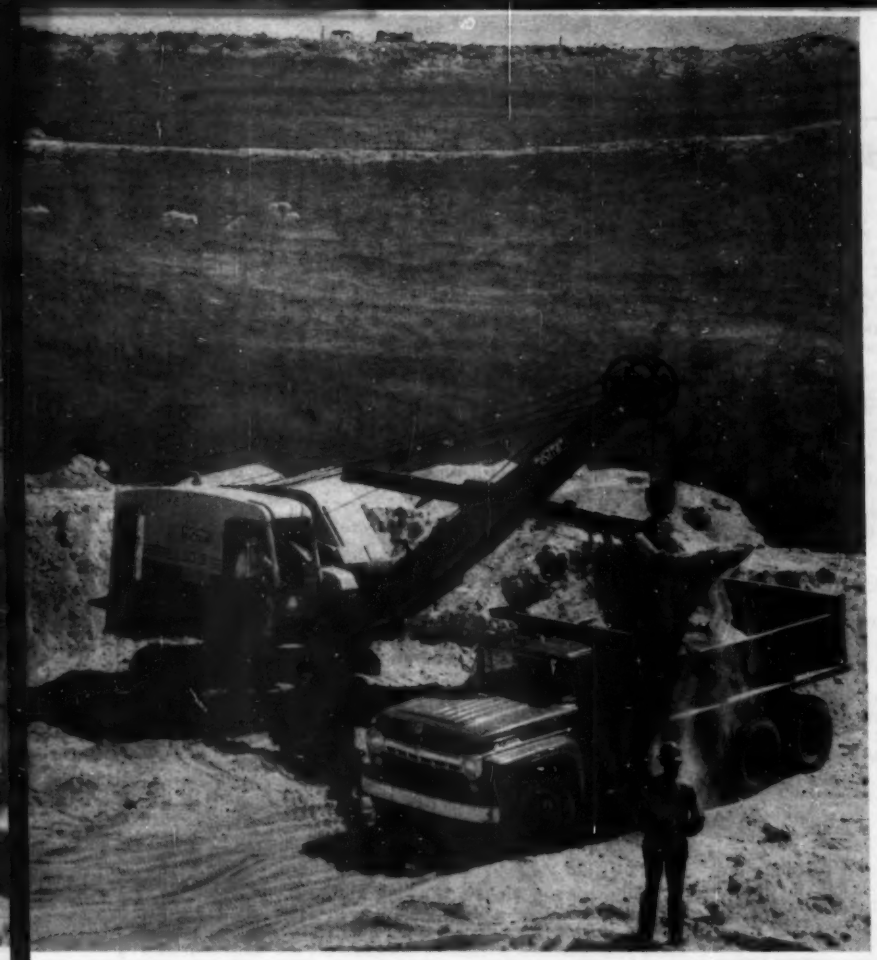
Mr. Adams is the last one to take credit for these accomplishments, but he is the driving force and fortunately has had loyal stockholders, capable advisors, and competent employees. Western Nuclear, almost from the start, wanted to operate a uranium mill. First mill contract talks were held with the Grand Junction, Colorado office of the United States Atomic Energy Commission in late 1955. Following the talks the company embarked on a five-front program necessary to secure a concentrate purchase contract from the AEC which would justify erection of a mill.

Here are the five steps that led to success:

1. Retained the Colorado School of Mines Research Foundation to make metallurgical tests to determine the amenability of the ore. Edmund C. Bitzer of Golden, Colorado was retained as consulting metallurgical engineer.
2. Western Knapp Engineering Company of San Francisco, California was hired to work out mill



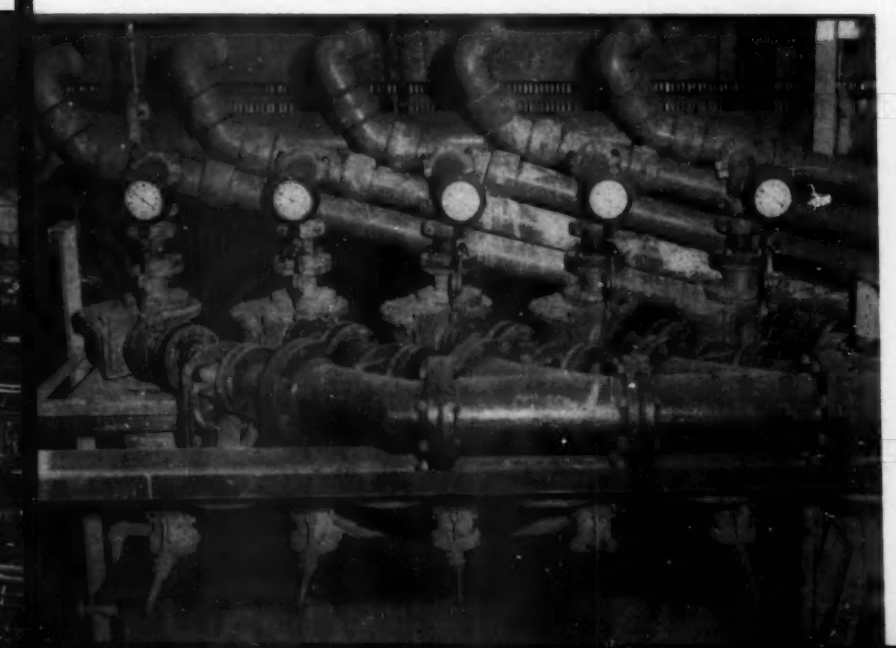
RIP PROCESS takes a lot of machinery. At right are banks and baskets with precipitation agitators at left.



LOADING ORE at Bullrush open pit in the west Gas Hills 25 miles from the mill. Pit wall is waste.

"Western Nuclear Did It!"

A Fully Integrated Uranium Producer



CYCLONES are key units for sand-slime separation. These Equipment Engineers units operate at equal pressures.

construction plans, design the equipment, and figure milling costs.

3. Stepped up its program to prove additional ore reserves in the Gas Hills.
4. Set out to persuade other Wyoming uranium ore producers to let Western Nuclear mill their ore if and when the mill was built.
5. Began a determined search for the money necessary to construct the mill.

The last step proved the hardest. On August 10, 1956 the AEC contract for a 440-ton-per-day mill was signed and Western Nuclear had to spend $336,000 of its own money on mill construction by year's end. Western Nuclear then borrowed $850,000, mostly from stockholders and friends; borrowed $2,400,000 from seven different banks for a three-year term at 5.0 percent and raised $2,350,000 by selling four-year debentures. Under this financing, control of Western Nuclear remains in Wyoming where the company was formed. Of the 11,500,000 shares of stock, only 20 percent were issued for mill financing. Contrast this with the 80 percent that one Chicago financial firm demanded for financing the mill.

Mill Built In Eight Months

It took only eight months to build the RIP mill, and the mill was designed and built with definite expansion in mind. Ground was broken in early November of 1956 and first ore was milled on July 6th of this year. As soon as the mill was in operation the company applied to the AEC for approval to increase capacity to 1,200 tons per day. This fast construction was made despite the severe Wyoming winter with blizzards and many days of below zero weather. Fortunately the buildings went up fast so that equipment installation was not slowed. The main mill has twin bays, is 240 feet long and 100 feet wide. It has steel framing, no windows to get dirty or broken, and is sheathed with two layers of galvanized iron incorporating three inches of insulation between them.

Once the building was complete, a two-ton-capacity overhead travelling crane was installed in each bay. Use of these cranes saved at least 30 days in construction time. They were used to

How WENCOR Makes the RIP Process Work at Wyoming Mill

PURCHASING ORE

The mill operates as a custom unit so all ore is weighed and sampled in accordance with AEC ore buying practices.

SAMPLING

Ore is mechanically sampled. Sampling plant can be operated to take a sample varying from 0.05 to 0.35 percent of feed. For sampling purposes ore is stage-crushed to minus-¼-inch. Company operates its own assay laboratory.

CRUSHING

Ore is crushed minus-2-inch by single stage jaw crushing.

FINE ORE STORAGE

Four bins for fine ore storage insure adequate capacity to permit one shift crushing. Ore independently drawn from each bin to permit blending mill feed to any ratio from four bins. A bypass truck bin makes it possible to independently crush and sample any lot and return it to stockpile.

GRINDING CIRCUIT

Maintain mill density at 65 percent solids at a 1.65 specific gravity.

Grind 100 percent minus-28-mesh. Operate classifier at 49 percent solids and 1.44 specific gravity.

LEACHING

Assume pulp flow of 114 gallons per minute and residence time of approximately 20 hours in nine agitators.

Add 75 to 125 pounds of sulphuric acid to No. 1 agitator per ton of mill feed. Control pH on No. 9 agitator to 1.0, temperature at 25° C.

Add 2.0 to 5.0 pounds of MnO_2 oxident to agitator No. 3. Terminal EMF-400 mv.

SAND-SLIME SEPARATION

Maintain RIP feed at 1.50 density and 8.0 percent solids with 30 percent minus-325-mesh.

Advance sands from No. 1 to No. 4 drag classifier with countercurrent washing.

Regulate valve on intake of each cyclone to maintain equal intake pressures. Change orifice as necessary to control underflow particle size.

Slime pulp is pumped through 48-inch SWECO vibrating screen with 100 mesh stainless steel cloth to remove all trash ahead of RIP circuit.

Maintain pH of 1.5 to ion exchange feed. (IXF)

Discard No. 4 classifier sand to tailing.

RIP CIRCUIT Exhaustion

To insure maximum drainage, each basket loaded in maximum depth of 10 inches with resin.

Average travel of each basket—160 inches per minute or a 16-inch stroke 10 times per minute.

At any given time, eight banks are on loading cycle, one is being changed to next cycle, and five are on continuous flow elution.

IX tailing = 0.01 gram U_3O_8 per liter.

Pulp to resin ratio on exhaustion = 6.0 to 1.0.

RIP CIRCUIT Elution

Use 5.0 to 1.0 ratio barren eluant to resin on elution. Pregnant eluate = 5.0 to 6.0 grams U_3O_8 per liter. Elution time for 3.5 pound loading is about 3.0 hours.

TAILING

RIP tailing flows to 8- by 8-foot, rubber-lined tank. Pumped to 48-inch SWECO vibrating screen with 28-mesh stainless steel cloth to recover any beads leaking through baskets. Slime joins sand tailing from No. 4 classifier and the two tailings join to form mill tailing which is pumped to nearby tailing basin.

PRECIPITATION

Pregnant eluant flows from banks to a 12- by 8-foot rubber-lined holding tank from which it is pumped through two Sperry sand filters. These are back flushing-type same as used for water works filtering. These filters remove carried over sand grains, trash, bentonite, etc. washed from resin. From sand filters the pregnant filtrate is pumped to one of three agitator tanks for batch precipitation. Sample of eluate is taken from filled tank and titrated with caustic to a pH of 7.2. From titration result the amount of MgO to be added for precipitation is calculated. Dry magnesium oxide (International Minerals and Chemical Company) is dropped directly into the top of the agitators. After MgO addition, tank is agitated at least 4.0 hours to secure complete reaction. Precipitate is pumped to thickener as tank is then needed for eluate storage. Western Nuclear uses the MgO because it is easy and safe to handle, precipitation takes place at mill temperature, produces a granular cake of high density which speeds filtration rate, and yields a higher grade yellow cake.

FILTERING

Yellow cake precipitate is pumped to 12- by 20-foot Denver thickener. Overflow is pumped to eluate make up, and underflow to 4- by 4-foot Peterson drum filter with 1st stage repulper. Cake is pulped and pumped to identical second stage filter. Filtrate from first filter flows to a 15 frame, plate and frame, press to recover any yellow cake in the filtrate. This filter is opened and cleaned periodically with cake being returned to filtered yellow cake agitator. The cake on both Peterson filters is washed to cut down sulphate concentration.

Cake from second drum filter drops to 6- by 6-foot agitator which acts as a surge tank.

DRYING-DRUMMING

On the day shift, yellow cake is pumped from agitator into pans one inch deep which stack in a movable carrier similar to a rack for baking bread. This rack is wheeled into gas fired oven for drying. The dried yellow cake is then packed in AEC drums for shipment.

place concrete, to pull electric wires through conduit, and to install machinery, etc. Today they are in regular use to deliver reagents to top of tanks and to speed repairs on equipment.

In brief that's the history of the company and how the mill was built. Here is what the mill has accomplished for the uranium industry and for uranium technology:

1. It is the first uranium mill built in Wyoming.
2. It is the first uranium mill to commercially use the new Dow-Ex11-X4.5 ion exchange resin beads.
3. It is the first to clarify the pregnant eluate by sand filtration, prior to precipitation of yellow cake.
4. It is the first to use oven drying for yellow cake.
5. And it is the first to use tensioned-screen baskets.

What is the significance of these developments? Metallurgy has been good from the start, and within several weeks after start up the mill was operating at 150 percent of designed capacity.

Western Nuclear's staff believe that this new resin can take harder regeneration (removal of poisoning elements such as silica, organic material, and molybdenum which cut down the uranium loading capacity of the resin). In other words the resin should last longer and be capable of regeneration more times. A solution of 5.0 percent caustic soda is used for regeneration. It is mixed in a tank on the first floor adjacent to the ball mill and pumped directly into the banks through lines built expressly for that purpose. Beads are carefully sized from minus-16 to plus-20-mesh for maximum pulp diffusion. The 4.5 at the end of the resin designation equals the percent cross linkage which in turn is a measure of the bead's porosity. This is highly important because the uranium-bearing pulp must diffuse clear through the beads to obtain maximum uranium loading.

The sand clarification of the eluate means a higher grade concentrate for shipment as suspended particles and crystals of sand, bentonite, organic trash, etc., washed from resin are removed ahead of yellow cake filtering and washing.

Yellow cake drying is a subject of debate among mill operators. Size of mill and cost of various types of driers are of great importance. Western Nuclear believes that for the money

This Is the Equipment Used at WENCOR'S New Uranium Mill

ORE DELIVERY
One 50-ton truck scale.
Paved storage area.
Truck bin, 50-ton capacity.

CRUSHING
Apron feeder, 36-inch by 8-foot.
Belt conveyor, 36-inch.
Wobbler feeder, 9- by 36-inch.
Jaw crusher, 20- by 36-inch.

SAMPLING PLANT
Chain and bucket sampler, 10 percent cut.
Vibrating screen.
Jaw crusher, 10- by 16-inch.
Chain and bucket sampler, 10 percent cut.
Vibrating screen.
Jaw crusher, 9- by 12-inch.
Vezin sampler, 20-inch, 3 percent cut.

FINE ORE STORAGE
Belt conveyor, 24-inch by 350-foot-long.
Motor driven belt tripper.
Truck bin, bottom draw off, 50-ton capacity.
Four fine ore bins, 325-ton capacity with Pioche gates.
Four 24-inch by 80-fot belt feeders.
Belt conveyors.
ABC®s weighing scale.

WATER SUPPLY
Cased wells sunk along bank of Sweetwater River. Pumped 2,500 feet to mill storage tank. Water use = 3.5 tons per ton of ore per day.

GRINDING CIRCUIT
One 6- by 6-foot Denver Equipment Company ball mill with trommel discharge.
One 48-inch Wemco screw classifier with chip screen.
Two 3-inch Wemco sand pumps on classifier overflow (one spare).
One 16-inch sampler (mill heads).

LEACHING
Nine 16- by 16-foot National wood stave tanks in series with Deco agitators (rubber-covered shafts and blades). Each agitator equipped for gravity flow or airlift to give circuit flexibility and agitator bypassability.

SULPHURIC ACID SYSTEM
Tank trucks unload by compressed air into 30- by 20-foot storage tank outside mill building.
One 50-gallon-per-minute pump transfers acid to mill storage tank.
One 10-gallon-per-minute pump transfers from mill tank to 2- by 3-foot steady head tank feeding Nos. 1 and 2 agitators.

SAND-SLIME SEPARATION
Four 6- by 20-foot Colorado Iron Works Esperanza drag classifiers in series. Rubber-covered shafts, 316 stainless steel blades with beveled edge of blade fastened to belt to prevent sand build up at pool edge. Outboard pillow bearings for shafts. Eight 6-inch Krebs cyclones. Intake pressure to each cyclone is regulated by valve on feed line.
One 48-inch SWECO vibrating screen with 100-mesh stainless steel cloth for chip and trash removal.
Four 350-gallon-per-minute SRL pumps.
Five 550-gallon-per-minute SRL pumps.

RIP CIRCUIT
One RIP feed tank, 20- by 7-foot, rubber-lined steel tank with rubber covered agitator.
Two RIP feed pumps (one spare), rubber-lined.
Seventy RIP baskets, each 54- by 54-inches, arranged in 14 banks of five cells each. Tyler 5225 screen made of 316 stainless steel.
One pregnant eluate tank, 12- by 8-foot, rubber-lined.
One pregnant eluate pump.
One RIP tailing tank, 8- by 8-foot, rubber-lined.
One 48-inch SWECO vibrating screen with 28-mesh stainless steel cloth.
One tailing sampler.
Two 6-inch SRL tailing pumps.

RESIN REGENERATION
One 8- by 8-foot NaOH mixing tank with Lightning mixer.
One iron pump.

ELUATE MAKEUP
Three 16- by 16-foot National wood stave tanks with rubber covered DECO agitators.
Two eluate pumps.

PRECIPITATION
Two Sperry sand filters.
Three 16- by 16-foot National wood stave precipitation tanks with DECO rubber-covered agitators.
Two precipitate pumps.
One 20- by 12-foot DECO thickener, rubber-lined steel tank.

FILTERING
Two 4- by 4-foot Peterson drum filters (in series) with water washing and repulping.
One plate and frame press with 15 wood frames (Peterson filtrate clarification).
Precipitate storage tank, 6- by 6-foot, with agitator.

DRYING-PACKING
Moyno pump.
Gas-fired oven drier.
Storage hopper and screw conveyor to shipping drums.

MILL PIPING
All lines carrying acid pulp or solutions are made of Uscolite plastic (United States Rubber Company). Joints are solvent welded to fittings or joined by Victaulic couplings. Keystone arc gate valves are used to control flow rates in all Uscolite lines.

invested its drying plant produces as dry a cake as any mill.

The tensioned-screens on the baskets mean that all screens, four sides and the bottom, are interchangeable. It is easy and fast to change any screen by removing only 14 clips, seven top and seven bottom. Screen life should be longer too because any screen works best under longitudinal stress.

Significantly the consulting metallurgist insisted on "over design" of key equipment so that no difficulty has been experienced in treating large tonnages. Yellow cake precipitation which gave initial problems at other mills has not been a problem. True, there were mechanical problems as well as corrosion but they have all been corrected. Remember, of course, that experience of other mill operators aided the Western Nuclear staff and they are most appreciative of this advice.

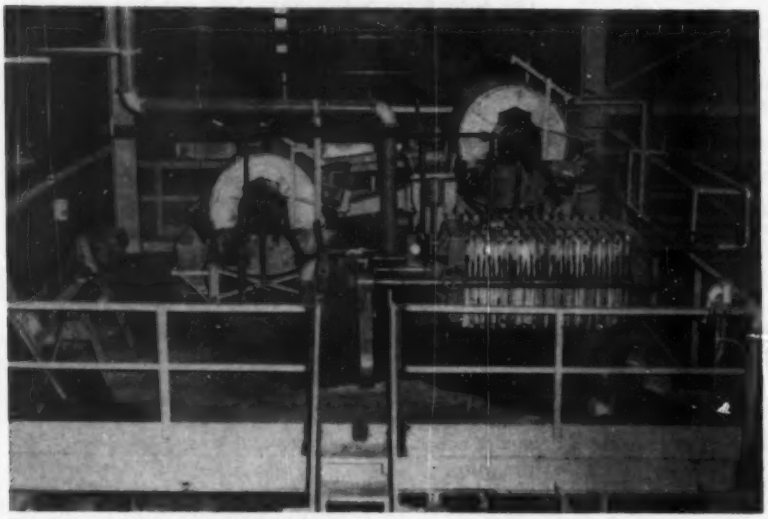
These are the outstanding differences at the Western Nuclear mill in comparison to other RIP plants. A typical operational cycle of the various circuits is presented below. Key equipment for each phase of the operation is shown separately.

WENCOR In Mining Business Too

Western Nuclear's largest mine is now the open-pit Bullrush 25 miles northeast of the mill. This mine is in Section 29, T. 33 N., R. 90 W. in the western part of the Gas Hills district. Incidentally Western Nuclear built, and has maintained, at its own expense, this 25 miles of road from the mill into the district to facilitate ore shipments to mill at a plentiful water supply.

The Bullrush ore body was discovered by airborne prospecting soon after the initial Gas Hills discovery. The claims were first owned by the Savanna Construction Company from Savanna, Illinois and some exploration drilling was done by the AEC. Savanna mined and shipped several thousand tons of ore from both open pits and underground workings in 1956. In February 1957 WENCOR started negotiations for purchase of the claims as a source of ore for the mill. An exploration drilling program was started, immediately, around the periphery of the Savanna ore body. Ore was found in many of the holes so more than 100 holes on 50-foot centers were drilled to 100- to 120-foot depths to delimit mineralization. A major ore body was outlined with mineralization occurring in a grey-

GRINDING TO MINUS-28-MESH liberates all the uranium minerals. Density in the Denver Equipment ball mill is maintained at 65 percent solids. Wemco spiral classifier density is held at 49 percent solids.



TWO-STAGE FILTRATION with washing on each filter is used to dry the yellow cake. Peterson drum filters are used. The plate and frame press in foreground is used to recover any yellow cake in filtrate from first drum.

STAINLESS STEEL AND RUBBER Colorado Iron Works drag classifiers operate in series to make sand tailing.

TENSIONED SCREEN BASKETS, the first anywhere, are used. Note only seven clips used at top of each screen.

colored, fairly-clean, poorly-sorted, medium-grained, sandstone. The flat dipping (5° to the south) ore body averages 8.5 feet thick but contains some lenses of waste. Mining, to assay walls, has subsequently shown ore not found by holes.

As the ore body was covered with lenses of friable sandstone with interbedded siltstone and shales, it was possible to strip the over burden without blasting before open-pit mining could be started. A four-stage mining plan was then drawn up by the engineering staff with stripping to start under Stage 1 to uncover the northernmost section of ore. A stripping contract for 265,000 cubic yards was awarded to Boatright and Smith of Rawlins, Wyoming at $0.28 per cubic yard. Under this plan pit walls are carried at 63° with a 40-foot-wide berm carried at a 55-foot depth, roughly one-half the total depth of finished pit. Using five Euclid scrapers holding an average of 21.5 cubic yards, two push tractors (A D8 and TD 24), and a D8 with a hydraulic ripper, an average of 5,630 yards were stripped per 10 hour day with a five-minute cycle time.

After stripping was completed a mining contract was awarded to the J. F. (Jerry) Whalen Company of Rawlins.

A Bucyrus Erie 30-B Diesel shovel is used to load ore into trucks operated by an independent ore trucker for transportation at the mill. The ore face is continually graded with a Geiger counter and flagged as ore or waste ahead of the shovel operator. As a second, grade-check, each truck leaving the pit is Geigered and shipped as either ore or waste. At times it is necessary to strip the hard cap rock ahead of the shovel. Best day's production has been 1,600 tons of ore.

As soon as mining started on Plan 1 a second stripping contract (Plan 2) was awarded for 361,000 cubic yards to extend the pit immediately to the south. With one additional scraper, an average of 6,500 cubic yards has been stripped per day and piled to the east.

Plan 3, which will be largest pit, is still being engineered as additional drilling continues to extend the limits of this ore body. It lies in the area immediately northeast of Plan 1, with waste to be backfilled in the mined out No. 1 pit. Plan 4 is east of No. 2 and south of No. 3. It is planned to use the waste, approximately 300,000 cubic yards, from No. 4 to backfill No. 2, but stripping is out-distancing mining, and No. 4 stripping has been started with the initial waste being sent to the same disposal area as used for spoil from Plans 1 and 2.

Western Nuclear's largest ore reserve is near the center of the Gas Hills and borders Lucky Mc's largest pit. It is in Section 26, T. 33 N., R. 90 W. An extensive stripping program will be necessary before any of the ore can be mined. Mining will be deep, too, before all ore is mined out, as drilling has proven ore to a depth of 260 feet with significant increase in grades as depth increases. Before WENCOR acquired these claims they had been drilled twice without any significant discoveries—once by the Texas Company, and once by Lucky Mc, both of whose holes were either too shallow or in the wrong place.

The geology department is continuously seeking new claims to drill and recently completed an exploration program on the Jeep, Thor, Day and Loma claims in the western Gas Hills.

The Staff

Here's the staff that Bob Adams has assembled to so successfully manage and operate Western Nuclear: Wendell Fertig, with long experience in Arizona, Colorado and the Philippine Islands, executive vice president and general manager; Ed Bitzer, mill operator in Colorado and the Orient and former metallurgical adviser for the Raw Materials Division of the AEC, consulting metallurgist; and J. W. (Bill) Joyce, a Butte, Montana base metal metallurgist who gained his uranium experience at the AEC's Monticello, Utah uranium mill, mill superintendent.

P. N. Thomas, chief metallurgist is from National Lead Company's pilot plant at Grand Junction, Colorado, as also is Marcelle Smith, general foreman. Lou Knocke, from the Monticello mill is chief chemist, M. E. Cenis is master mechanic, and W. H. Jones is office manager.

The ore procurement and engineering staff is headed by chief engineer, John Hudson. R. T. Brown is mining engineer; Jerry McDonald, Bullrush pit foreman, and Harold Johnson is civil engineer.

Eric Newman is chief geologist and is assisted by field geologists Bill Street and John Hoffman.

Ore Key To Milling Rate

Western Nuclear and Bob Adams have been in a hurry, and they still are as the current application to the AEC to enlarge mill capacity to 1,200 tons per day indicates. Key to expansion must be positive ore reserves in the Gas Hills in the face of increased competition by one other established milling company, and three other well financed major concerns and partnerships who all want to get into the milling business.

Western Nuclear Corporation is counting heavily on its Gas Hills' Frazier-Lamac ore bodies for future ore, but it will require both time and money to strip the deposit and start mining. During that interim, shallow deposits on some of the other properties will meet tonnage requirements.

Western Nuclear was fortunate in being the first to start milling in Wyoming, and thereby receive important custom ore shipments. The planned expansion of the mill is consistent with a successful and aggressive continuing exploration and development program. Indicated and inferred ore reserves on company-owned and controlled holdings can meet the milling requirements of the expanded mill for 10 years or more. These reserves coupled with important custom ore receipts provide more than adequate tonnage for a very long and profitable operation of the Jeffrey City mill of Western Nuclear Corporation.

THE END

R. W. ADAMS
President

W. FERTIG
General Manager

J. HUDSON
Chief Engineer

J. W. JOYCE
Mill Supt.

R. T. BROWN
Mining Engineer

E. C. BITZER
Cons. Metallurgist

E. NEWMAN
Chief Geologist

P. N. THOMAS
Chief Metallurgist

M. SMITH
General Foreman

WESTERN NUCLEAR CORPORATION's new uranium mill sits alongside the Old Oregon Trail which came through center gap in hills in background. From left are the crushing plant, fine ore bins, main mill, and shop and office building.

Photo by Joseph Brignolo for ASARCO

STRIPPING SHAVES off the top of Toquepala as this panoramic view shows. Waste dumps will fill the canyons at top left and behind main peak. Five 8-yard electric shovels and five rotary drills can be seen in the picture.

How Southern Peru Stripped 20,000,000 Tons of Toquepala Waste In First Year

Peruvian Aerial National Photographic Service

TOQUEPALA BEFORE STRIPPING started in 1956. This photograph taken in 1954 shows the network of roads built to regularly spaced churn drill exploration sites. Exploration camp is at lower right. Top of the picture is north.

Southern Peru Copper Corporation's stripping schedule is right on time—and it's a fast schedule, too—with 40,000,000 tons of rock planned for removal in 18 months following the first dipper full moved on November 5, 1956.

In October, 1956, one of the largest open-pit blasts in history was fired to break 1,067,000 tons of waste as stripping started. In this blast 700 churn and rotary holes totalling 51,589 feet in length, and loaded with 270,000 pounds of explosive were fired. Today ammonium nitrate prills have replaced quarry powder for blasting with a considerable saving.

Stock ownerships of Southern Peru Copper Corporation is distributed 57.75% to American Smelting and Refining Company, 16% each to Phelps Dodge Corporation and Cerro de Pasco Corporation and 10.25% to

Newmont Mining Corporation. In 1955, Southern Peru acquired title to the Toquepala and Quellaveco properties from ASARCO and to the Cuajone mine from Cerro and Newmont.

The accompanying pictures give you an idea of how much work has been accomplished in just one year at the mine in the Andes foothills of Peru. By the first anniversary, November 5, 1957, approximately 20,000,000 tons of waste have been drilled, blasted and loaded on 10 benches and trucked to waste dumps on three major benches.

This is a remarkable accomplishment and the entire Toquepala project is remarkable, too. Remember that it is the largest copper mining venture to be undertaken in a previously unmined and totally undeveloped area in many years. Undeveloped and far off is the best way to describe the area before Southern Peru got moving. Toquepala is 10,600 feet above sea level, is about 50 miles air line from the sea coast, has only a small annual rainfall, no nearby cities, and no local source of power.

For stripping, Bucyrus-Erie and Joy rotary drills are used for the 58-foot-deep blast holes. Broken rock is loaded by 10 P and H 8-yard electric shovels into Dart and Mack trucks powered by Cummins Diesel engines. Bench height is kept at 50 feet. More than 129,000,000 tons of waste will be dumped in nearby canyons before the stripping job is completed. However, the ore will be exposed on several benches as stripping progresses.

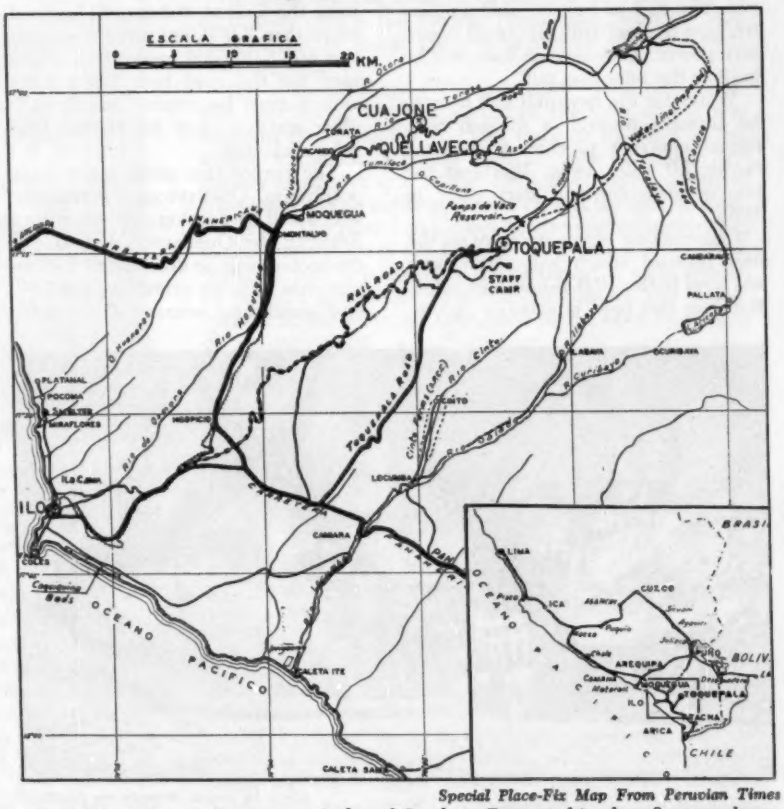
Electric power to operate the shovels, rotary drills, for camp purposes and for machine and repair shops is now generated in what will be the auxiliary Diesel plant. There are five, Nordberg, four-cycle, 1,850-horsepower engines driving 1,295-kilowatt generators.

Work on the 30,000-ton-per-day flotation mill and crushing plant is underway along the side of a nearby valley. More than 1,800,000 cubic yards of rock is being excavated and about 4,000,000 yards will be filled to prepare the site for construction of the mill and main shops. Ore from the mine will be transported to the crushing plant in standard gauge railroad cars. The Stearns Roger designed mill is being built by Cia. Utah Pacific Ltd. and Cia. Constructora EMKAY del Peru, joint venturers, who hold a construction contract covering the entire project except the mine stripping and the pier at Ilo.

At the port of Ilo, the permanent wharf is about completed. Construction on the smelter and permanent power plant on the Pacific Ocean 15 miles north of Ilo will start soon. The

Photo by Joseph Brignolo for ASARCO

BIG EIGHT-YARD DIPPER soon fills this Mack 25-ton waste truck. Note the good fragmentation of hard rock.



Special Place-Fix Map From Peruvian Times

TOQUEPALA is in the western Andes of Southern Peru as this place-fix map shows. The smelter will be built north of the port of Ilo and will connect with the mine by railroad. Cuajone and Quellaveco porphyries are also located on map.

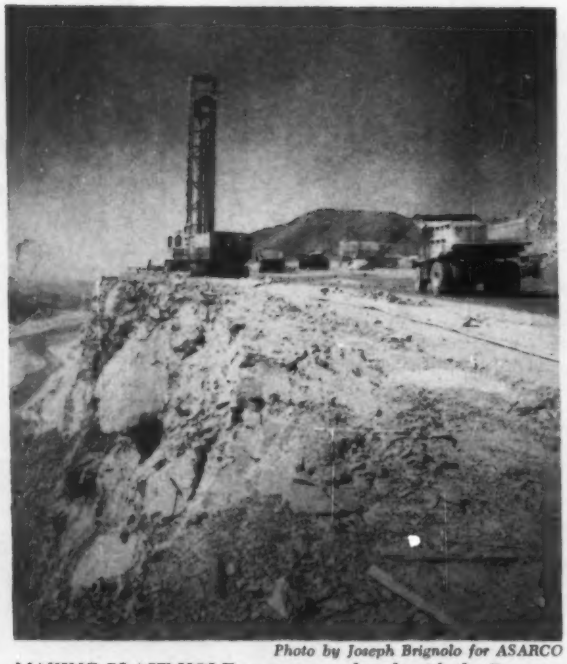


Photo by Joseph Brignolo for ASARCO

MAKING BLAST HOLE on an upper bench with the Bucyrus-Erie rotary drill. The 50-foot-high benches show plainly. Trucks and shovel at work on upper bench.

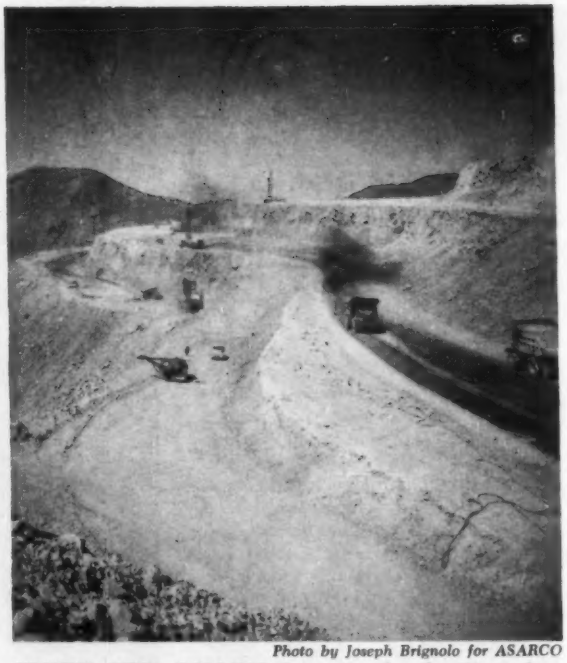


Photo by Joseph Brignolo for ASARCO

TRUCKS KEEP ROLLING from two shovels. Waste from lower bench is trucked to canyon in background while upper bench waste is hauled to opposite dump.

smelter will have an annual capacity of about 140,000 tons of blister copper. The fuel-oil-burning thermo-electric power plant will supply all necessary power. Transmission lines will be built to the mine and mill.

Water for the new mill will have to be brought through a 42-inch reinforced concrete pipeline from Lake Suche, 50 miles away. Work on the line construction will start early in 1958.

Construction crews are busy on the new railroad which will climb from sea level to the 10,600-foot-high mine. Building this road is a major accomplishment as more than 400,000 ties and 30,000 steel rails, all imported from the United States, will be used. More than 7,000,000 yards of excavation and 5,000,000 yards of fill will be used for the road bed. Eight major valleys must be crossed on fill while other sections must be blasted from solid rock cliffs.

The corporation owns other major porphyries, Quellaveco and Cuajone, which will be developed in the future. Bringing the Quellaveco deposit into production will be done when the corportation believes economic and technical conditions warrant. Overburden must be stripped and the mine developed. Exploration since 1947 has developed 200,000,000 tons of ore of slightly lower grade than at Toquepala. However, the stripping ratio is lower and not as difficult.

At Cuajone, 15 miles north of Quellaveco, exploration since 1942 has developed 400,000,000 tons of approximately 1.0 percent copper.

Southern Peru will be in the copper business for a long time and 7,000 men with $20,000,000 worth of equipment are working day and night to get it into production by 1960.

THE END

Photo by Joseph Brignolo for ASARCO

STRIPPING TEAM AT TOQUEPALA never stops as the loaded truck at right pulls away from shovel for the waste dump the empty truck at left pulls alongside the P and H 8-yard electric shovel. Blast hole drill at work on higher bench.

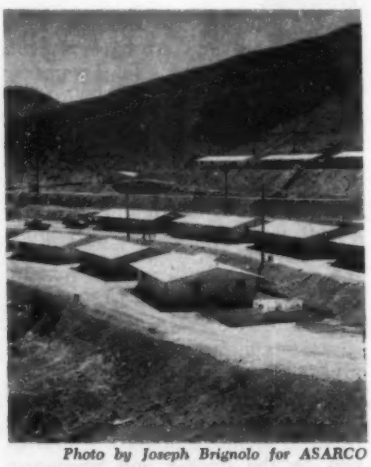


Photo by Joseph Brignolo for ASARCO

MODERN HOUSING has been built near the mine for staff directing the stripping. New town will be built at mill.

Money Making Methods

How Proper Lubrication of Dragline Cables Added 28 Percent More Life

An idea for lubrication submitted through American Cyanamid Company's employee suggestion plan extended dragline hoist cable life more than 28 percent and resulted in a cash award of $1,250 for Martine Hall, dragline oiler from Seffner, Florida.

Cyanamid operates two mines in the Florida pebble phosphate field, with phosphate operations headquarters at Brewster in Polk County. In its mining operations the chemical firm uses four large Bucyrus-Erie walking draglines. Three of these machines are 650-B's using an 18.6-cubic-yard bucket; the other is a 500-W using a 15.3-cubic-yard bucket. All four machines have 175-foot booms, and use 9x41 wire center hoist cables. The hoist cables on the 650's are 2¼ inches in diameter and 406 feet long, and on the 500-W, 2 inches and 406 feet, respectively.

Late in 1951, Cyanamid began lubricating these cables with a light liquid cable lubricant which resulted in an appreciable increase in cable life over that experienced under the previous lubrication method.

However, Martine Hall, who had been oiling on the large draglines since 1949, observed that the flexing of the cables, even when they were apparently well-lubricated, resulted in flecks of rust working up from the center strands from time to time. To him that meant the inner strands of the cable were not getting the maximum benefit from the lubricant, and he looked for a solution.

CHECK AND AWARD are presented to Martine Hall for his idea which extends dragline cable life. From left are: Grady Barnett, mill superintendent; Arthur Crago, manager; Mr. Hall, dragline oiler; and Erwin M. Haynsworth, mines manager. The award was made at American Cyanamid Company's Sydney, Florida phosphate operations.

Mr. Hall had observed the way penetrating oil works its way through rust and into crevices, and reasoned that it might do the same on wire cables, carrying lubricant with it. He suggested this possibility to a Cyanamid lubrication engineer who said, "Try it." After trying the penetrating oil-cable lubricant mixture on two cables on his machine he submitted a formal suggestion through Cyanamid's employee suggestion plant which is designed to encourage just such creative thinking.

Investigation of the suggestion began at once, and Cyanamid's Brewster maintenance department set up a testing program on one 650-B at each mine. Under the testing program, cables lubricated with cable lubricant alone were alternated with cables which received the lubricant-penetrating oil combination. On the latter, penetrating oil was applied weekly, the machine operated 24 hours, and the liquid cable lubricant was then added. Both materials were poured over the cable by hand as it was slowly run onto the drum or over the boom-tip sheave. Comparisons were made on cables of several different makes.

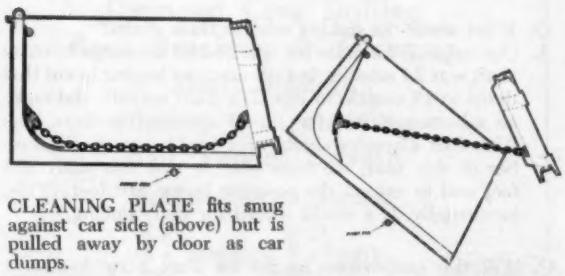
After completion of the preliminary tests, the new procedure was installed as standard on all four of Cyanamid's large draglines. Further experience was obtained in this way, and final evaluation was based on performance records of 25 cables which received the lubricant alone and 14 cables with the penetrating oil-cable lubricant combination. Comparison of the records of the 39 cables revealed that those receiving the penetrating-oil-cable lubricant combination averaged 28.4 percent more useful life than those lubricated with the light liquid cable lubricant alone.

Mines maintenance superintendent Eugene S. Anderson, who supervised the tests, explains that the penetrating oil not only makes its own lubricating qualities available to the cable's inner strands, but also carries the regular lubricant from the outer to the inner strands.

This Simple Device Will Clean Your Granby Cars Automatically

An automatic car cleaning device has been installed on all Granby cars at the Premier (Transvaal) Diamond Mining Co. Ltd. in South Africa with perfect success, reports the company.

The diamond-bearing "blue ground" becomes almost like clay during the wet season of the year and it was economically unfeasible to clean the cars by hand so this simple automatic cleaning method was invented. The cleaner consists of a 5/16-inch-thick steel plate hung from five chains on the inside of the car against the side opposite the door. The plate has a curved bottom edge conforming to the inside slope of the car body. A length of 7-ply, used, conveyor belt is fastened to the plate and is wide enough to extend a few inches across the car bottom. The bottom corners of the plate are connected to the door by lengths of 5/8-inch chain.



CLEANING PLATE fits snug against car side (above) but is pulled away by door as car dumps.

As the car tips and the door opens for dumping, the door movement shortens the chains pulling the hinged side plate away from the bottom corner. This scraps the side and a portion of the bottom forcing all muck out of the car.

It will take some experimenting at your mine to determine the travel length of the swinging plate. The plate must move far enough to displace the muck, but too much travel distance can damage the car dumping linkage or force the car to tip over.

with Robert Annan, Chairman Consolidated Gold Fields

Robert Annan of London, England is chairman of Consolidated Gold Fields of South Africa, Ltd. Consolidated Gold Fields is justly famous as one of the world's largest gold producers, but what is not so generally known, is that the organization owns and administers 16 great mines and various subsidiaries throughout the world. Production includes coal, platinum, uranium, tungsten and virtually all non-ferrous metals. Mr. Annan received his education at Columbia University and worked for two years at Ray Consolidated Mine in Arizona following graduation. He joined Consolidated Gold Fields as Resident Engineer in London in 1930, rising through the ranks to his present position. In May 1957 Mr. Annan was awarded the Egleston Medal, a citation presented in honor of Thomas Egleston, who founded the first school of mines in the United States at Columbia in 1864.

How The Future Looks For Gold Fields

Q. Consolidated Gold Fields is the world's largest gold producer, isn't it?

A. No. At the present time it stands in third place among the South African groups as a producer of gold, but it has substantial interest in the production of other metals, notably platinum.

Q. What new mines will your group bring into production in South Africa?

A. In South Africa, the next will be the Free State Saaiplaas Mine in the Orange Free State where shaft sinking is now in progress. These are concrete-lined circular shafts of 24 feet and 27½ feet inside diameter respectively and will be sunk to a depth of 6,600 feet.

Q. What about the sinking rate for these shafts?

A. Our original estimate for the 24-foot diameter hoisting shaft was 24 months, but we are now hoping to cut that down to 18 months or less. The shaft actually did make an advance of 686 feet in 31 consecutive days. The 27½-foot diameter shaft is for ventilation. In September of this year, we were able to sink this shaft 834 feet and to extend the concrete lining 810 feet. (This, incidentally, is a world record for shaft sinking.)

Q. Will this enable you to get the Free State Saaiplaas mine into production any faster?

A. It looks, then—and I ought to touch wood when I say that—as if we will beat our previous estimate and perhaps save a year in getting to production and cut our capital estimate, I think, about £2,000,000.

Q. Why is the capital estimate reduced so much?

A. In the opening of new mines, we are now faced with a problem of operating at considerable depth. It now takes from five to six years from a grant of a mining lease to bring a mine into full production. The cost of bringing a mine into productivity at the rate of, say, 100,000 tons milled per month, before the war was about £4,500,000 sterling. Today it would cost anywhere from £12,000,000 to £14,000,000. It is obvious in these circumstances that speed in development is a most important factor to cut down the overhead charges while the mine is being brought into productivity, and a saving of a year would probably mean a saving of capital expenditure of very nearly £2,000,000. Average figures for a field such as this are apt to be misleading.

Q. Your group has just gained control of the South West Africa Company, hasn't it?

A. Yes, in partnership with other South African mining groups.

Q. This gives your group control of the largest vanadium mine in the Sterling area, doesn't it? Will you expand vanadium output?

A. The scale of future production of vanadium will depend to a large extent on the results of exploratory development. Our first objective is the general exploration and development of the area in the hope of new discoveries.

Q. What other minerals are present at the Abenab West mine?

A. Lead, zinc, and copper are the principal minerals of the area; also some tin and tungsten.

Q. Does your company have an interest in the new gold mines in the Bethal-Kinross area of South Africa? This is the newest gold district in South Africa, isn't it?

A. No, we have no direct interest in this field.

Q. Do you think that other new gold districts will be developed in South Africa? Do you care to comment where and how soon?

A. All the gold mining groups continue actively to prospect for new gold bearing areas. The more likely areas are rapidly being covered but the possibility of further discoveries cannot be excluded. More than this, it is not possible to say.

Q. With gold at a fixed price what measures are your mines taking to lower costs?

A. Mechanization to increase the ouput of underground labor.

Q. What is your opinion as to the future of gold?

A. I believe that gold will continue to be in demand throughout the world as a store of value and a medium of exchange.

Q. Has your company become more aggressive in exploration in Africa?

A. The company has been increasing its program of exploration in various parts of Africa and also in the United States, Canada, and Australia.

Q. What minerals are you seeking?

A. We have no particular mineral as an objective and are prepared to exploit any mineral for which there is a demand in commerce and which can be profitably worked.

Q. What mining companies and mines does Gold Fields control in the United States?

A. In mining, the Iri State Jinc Company, Inc., operating zinc mines in Illinois and Virginia.

Q. Will you expand mining operations here in the United States?

A. The Gold Fields American Development Company, Ltd. continues to seek new mining opportunities in the United States and carries out a continuing policy of exploration either by itself or in partnership with others. A similar policy is being actively followed by the parent company through subsidiaries in Canada and Australia.

Q. Do you send foreign engineers to United States mines to learn new methods and techniques? Do you send United States engineers abroad for the same reasons?

A. Yes, there is regular exchange of experience in both directions.

Q. Does United States developed and built equipment play an important part in your foreign mines?

A. Certain special lines are always required but the difficulties of dollar exchange and the rapid increase of local engineering production in South Africa tend to limit the amount.

Q. What types of equipment developments are desired most by your global mine operators?

A. Labor saving equipment for the handling and transport of ore. Any improvement in cost and power consumption for the crushing and grinding of ores would be welcome.

Muriel Sibell Wolle Describes

Pinos Altos: New Mexico Gold Camp

Silver City, New Mexico is lively. Pinos Altos, just 10 miles away, is drowsing. A winding road that climbs steadily joins the two. Silver City did not exist in 1860 when three California prospectors, Col. Snively, Birch, and Hicks, combing the country for colors, worked their way west from Mesilla to Santa Rita and from there to a pine-studded gulch, through which ran a stream of water. Birch was thirsty and while drinking from the stream—some say it was Bear Creek and others Rich—he spied colors in its bed. Further prospecting revealed additional gold. By the time the men returned to Santa Rita for supplies and blabbed about their discovery a new mining district was born.

The little camp that sprang up at the diggings was called Birchville, after the discoverer. Within four months it had attracted 700 men, all busily washing gravel or crushing it in crude arrastres. Returns ranged from $10 to $15 per day per man, especially in the vicinity of the discovery claim. By December, 1,500 men were actively engaged at the diggings and Thomas Mastin had discovered the first lode mine, the Pacific, the most successful producer during the life of the camp. Its total production exceeded $1,000,000 in value.

More lode claims were located in 1861, the most important of which was on the Locke vein, to be known later as the Mountain Key. That same year the governor of the Territory reported that 30 gold lodes were being worked by 300 men.

But, mining in 1861 was hazardous because of Apache Indian raids. On several occasions large bands of savages led by Mangas Coloradas and Cochise attacked the miners. Thomas Mastin was captain of a company of volunteers. Although the miners ultimately routed the Indians, in one of the last encounters, Mastin was wounded and died a few days later. Since it was autumn, most of the men left, believing themselves lucky to get out of the country alive.

In February 1862, Mexican miners, angered by the high-handed decision of the Americans which forbade them to locate claims along the channels of the main gulches, prepared to run the Anglos out of camp but were dissuaded by the "timely interference of Don Manuel Leguinazabal." By 1864 nearly all the Americans had left and the Mexicans who stayed renamed the camp Pinos Altos, because of its situation in a forest of tall pines.

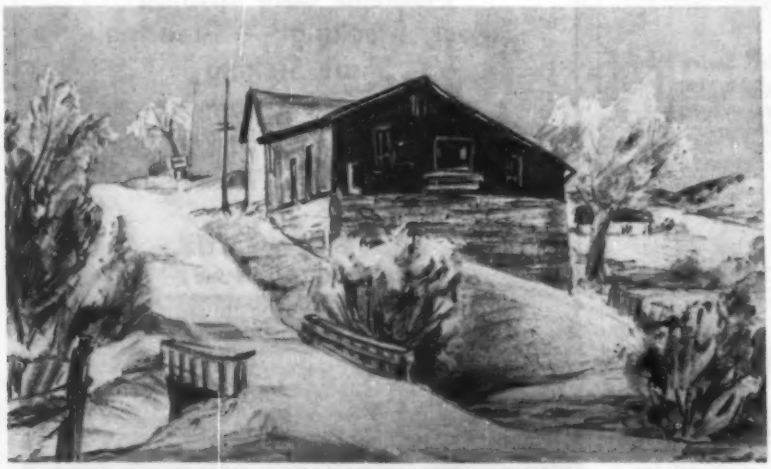
The second stampede to the diggings came in 1866 when men swarmed in from all directions, lured by news of new discoveries of gold-bearing quartz. During that summer every mule in camp was furnishing power for the 75 arrastres then in operation, and as one miner put it—"that meant nights and Sundays too." The Cleveland mine is claimed to have been discovered by J. Amberg, a German metallurgist, prior to 1866. Satisfied with the quality of the ore, he and others, including Virgil Mastin, organized the Pinos Altos Mining Company. By July 1867, the company completed a sawmill and a 15-stamp mill, the second quartz mill in the Territory of New Mexico.

By 1869, 213 quartz lodes had been located and recorded in addition to many placer claims. The Pacific mine alone "furnished surface ore for 31 stamps." But, as in all camps, when the surface gold was exhausted, the base or sulphide ores of the district refused to respond to the stamps and other types of machinery were needed.

The year 1872 saw changes at Pinos Altos. Skillicorn & Company built and successfully operated the Mud Turtle mill; with its success, mining became active again and the "hillsides echoed to the hammer, the drill, and the blast."

All through the 1870's, mining continued, but on a small scale, with individual miners grinding pay dirt in arrastres or pounding it to powder in hand mortars. Then, during 1883, Peter Wagner built a 5-stamp mill equipped with concentrators which successfully handled the refractory ores from the Atlantic and other mines. Three years later, Bell and Stevens reconditioned the Place-Johnson mill and ran it on ore from the Mina Grande mine. Another group of investors bought the Deep Down and from it produced ore that netted a profit.

When new deposits of high-grade ore were discovered in the Mountain Key mine in 1887, Lunger & Company leased and bonded it and later sold out to Gen. Boyle, who organized a stock company, built a 20-stamp mill and in a short time recovered $500,000. Other active lode mines at this time included the Osceola group, the Aztec, and the Golden Crown. Some $12,000 worth of gold was recovered from the Mountain View mine in 1889 and then the vein pinched out. The owner sold it to M. Mead for $10 and he too became



General store at Pinos Altos, New Mexico.

discouraged and disposed of it to James Demorest, who recovered $390 by using a hand mortar and a horn spoon!

The Silver Cell, a mine rich in silver, was discovered in 1891 by the three Dimmick brothers who were homesteading in the vicinity and raising dairycattle. One of the brothers, while driving the cows to a hillside pasture, picked up a rock to throw at one of the animals. He was surprised by its weight and, watching where it landed, he picked it up and found it was almost pure silver. He and his brothers then searched and discovered the lode. In 1903 they disposed of the mine. A small custom smelter was later erected on the property.

In 1896 the Hearst estate of San Francisco, California became interested in the area and obtained possession of certain mines. These it worked until 1903 when it sold them and its Silver City smelter to the Comanche Mining Company.

Hauling and smelting costs were still high and mine owners looked forward to the completion of a narrow gauge railroad from Silver City to the camp. Construction was begun in 1905 and completed the following year. As the first train load of ore slid down the grade to the smelter, mine operators felt assured that a new era of mining was beginning in the district. But, the Comanche Mining & Smelting Co. failed in 1908 and closed its concentrating and smelting plant in Silver City. With its shut down, Pinos Altos' boom days were over.

Today Pinos' Altos' buildings are half hidden by orchards, for fruit growing has supplanted mining as the chief industry of its small permanent population. Mining remains in the blood of the people and small flurries of placering follow each heavy rain which washes pay gravel downstream. When I visited the camp in 1955 and wandered inside the big corner store, the owner showed me a small bottle of gold. He explained that a number of his customers panned gravel whenever they wanted a little extra money and that he accepted the gold, in lieu of coin, and sent it in to the the Mint. "It keeps them in tobacco money," he added as he turned the bottle of golden grains to the light so that I could see the glitter of its contents.

Pinos Altos is so quiet now that voices or the sound of a hammer carry long distances, and it is hard to picture the place with 14 saloons running full blast and with a daily stage dashing up to its leading hotel, the Pacific House, which advertised itself as "The only American Hotel in the City." THE END

United States

Personalities in the News——

DR. FREDERICK C. KRUGER has been promoted to director of mining and exploration for International Minerals & Chemical Corporation in Chicago. Prior to joining International in February of this year, as chief geologist, Dr. Kruger was chief geologist for Reynolds Metal Company at Little Rock, Arkansas, and held the same position with the Cerro de Pasco Corporation at La Oroya, Peru, from 1941 to 1949.

William L. Kendrick has been named to succeed **Royce A. Hardy, Jr.,** as general manager of Manganese, Inc. at Henderson, Nevada. Mr. Hardy is now Assistant Secretary of the Interior for Mineral Resources. **Robert A. Blake,** former mill superintendent of the company's processing plant, will replace Mr. Kendrick as general superintendent.

Ivor G. Pickering, former chief design engineer for Kennecott Copper Corporation's Western Mining Division, has been assigned as project manager for construction of the new electrolytic refinery under construction near Baltimore, Maryland. **John D. McIver** has been named project engineer. Mr. McIver was previously tank house general foreman at the company's Utah Copper Division refinery at Garfield, Utah. The new refinery is scheduled to begin operations in 1959.

Donald L. Marksbury has accepted a position as staff geologist at Kennecott Copper Corporation's Ray Mines Division in Ray, Arizona. Mr. Marksbury was recently discharged from active service with the National Air Guard.

Arthur M. Henderson, former assistant superintendent of Pickands Mather & Co.'s Tioga No. 2 mine, has been promoted to mine superintendent. **Harland Stetson,** former assistant superintendent of the company's operations in the Cuyuna district, has been promoted to district mine superintendent.

B. F. Mahoney is now manager of employee and public relations for the Bunker Hill Company at Kellogg, Idaho. He succeeds **Charles E. Schwab** who has been transferred to the San Francisco office to serve as assistant to the president. Mr. Mahoney was previously manager of Bradley Mining Company's Yellow Pine antimony mine and smelter at Stibnite, Idaho, and is succeeded by **Joseph E. Gordon.**

Fred Murray has been appointed metallurgical accountant at Kennecott Copper Corporation's Ray Mines Division Comptroller Department at Hayden, Arizona. Mr. Murray transferred to the Ray plant in September after working in the Nevada mines division for almost 12 years.

Gerald Fitzgerald, chief topographic engineer of the United States Geological Survey, retired recently after 40 years of service with the Survey. **George D. Whitmore,** former deputy chief topographic engineer, was named to replace him.

James A. Johnson has been promoted to assistant underground foreman at the M. A. Hanna Company's Wauseca mine. **Louis P. Grailer,** former maintenance mechanic at the company's Homer mine, is now maintenance foreman at the Cannon mine. Other company promotions include **Arthur Lamber,** former shovel operator at Enterprise operations, now pit foreman; and **Raymond Kernon,** former shovel operator and Eimco operator, now assistant mine captain at the Iron Mountain mine.

Frank J. Hitchcock, former general pit foreman at the Plummer Mine operated by Oliver Iron Mining Division of U. S. Steel Corporation in Coleraine, Minnesota, is now assistant superintendent of the mine. Mr. Hitchcock joined Oliver in 1949 following graduation from the Montana School of Mines.

R. D. BRADFORD, vice president and director of American Smelting & Refining Company, will also take charge of the company's federated metals division. Mr. Bradford, who joined ASARCO's staff in 1926 as a junior metallurgist, has served as manager of the company's smelter in East Helena, Montana; manager of the Selby, California plant; general manager of the Western Department, and was elected vice president in 1952. He is also president of the company's new asbestos producing facility, Lake Asbestos of Quebec, Ltd.

Edwin L. Anderson, mechanical engineer for the Western Mining Divisions of Kennecott Copper Corporation, has been named project engineer in the consulting metallurgical section. Lavon Whitney, former design engineer, is now mechanical engineer in the division engineering department.

Fred D. Waltman has resigned his position as general manager of Florida Manganese, Inc. at Deming, New Mexico to accept a position with United Western Minerals Company of Santa Fe, New Mexico, where he will be in charge of all mining operations for that company.

Dr. Paul F. Kerr, geologist and professor of Mineralogy at Columbia University in New York City, will receive the K. C. Li Medal for meritorious achievement in advancing the science of tungsten. The award was established in 1948 by K. C. Li, now president and chairman of the board of the Wah Chang Corporation. Dr. Kerr has recently made several studies of uranium deposits for the Atomic Energy Commission and participated in the International Conference on the Peaceful Use of Atomic Energy held at Geneva, Switzerland in 1955.

Robert M. McGeorge, former assistant to the manager of the Utah Department of American Smelting & Refining Company, is now assistant manager of the company's Southwestern Department with headquarters at ASARCO's smelter in El Paso, Texas.

Allen D. Gray, general manager of Mines Development, Inc. and Fremont Minerals, Inc., has been elected executive vice president and director of both companies. Mr. Gray is a former Colorado School of Mines instructor.

Ray Medlock has been appointed to replace **William H. Lewis** as general manager of the Moab Drilling Company in Moab, Utah.

Harold Howling has accepted a position with Arthur D. Little, Inc. in the Process Metallurgy Department. Mr. Howling was previously employed with the Hudson Bay Mining & Smelting Company at Flin-Flon, Manitoba, Canada.

Dr. David W. Mitchell recently joined the staff of Foote Mineral Company as manager of Minerals Research. Dr. Mitchell served as associate professor of metallurgy at the University of California for 12 years.

John Blizard, director of research for the Foster-Wheeler Corporation of New York City, received the 1957 Percy Nicholls Award for achievement in the field of solid fuels. The presentation was made at a joint conference held in Quebec City, Canada recently by ASME, AIME, and the Canadian Institution of Mining & Metallurgy.

W. R. Landwehr, chief geologist for American Smelting & Refining Company's Western Mining Department has been appointed acting manager of the department, with offices in Salt Lake City, Utah.

Following the retirement of **E. A. Evans, Charles W. Barrett** will assume duties as manager of the southern district of the Republic Steel Corporation. **Harry H. Northrup,** former assistant district manager at Buffalo, New York, will succeed Mr. Barrett as manager of the Buffalo operations.

Jack V. Everett, geologist for W. S. Moore Company, has returned from Canada where he spent two months engaged in exploration and drilling operations in the Mount Wright area near the Quebec-Labrador border.

Fred D. De Vaney, chief metallurgist for Pickands Mather & Co. in

CONRAD W. THOMAS, mining consultant, is now in business at the Bank of the Southwest Building, Houston, Texas. Mr. Thomas's former experience includes five years of mineral exploration for Texas Gulf Sulphur Company in Europe, Japan, North Africa, Middle East and the United States. More recently he was employed as consulting mining engineer for Pan American Sulphur Company in Central America and parts of the United States.

Duluth, Minnesota, will receive the American Institute of Mining, Metallurgical and Petroleum Engineer's Robert H. Richards Award for "achievement that furthers the art of minerals beneficiation." A second AIME presentation, the Benjamin F. Fairless Award, will go to **Hjalmar W. Johnson**, vice president of the steel manufacturing division of Inland Steel Company in Chicago, Illinois. This award is given in recognition of "distinguished achievement in iron and steel production and ferrous metallurgy." The awards will be made at the annual AIME banquet in February.

Sutherland G. Cole, Jr. is now employed by the Phosphate Chemicals Division of International Minerals and Chemical Corporation as a project engineer at the company's Bonnie plant in Bartow, Florida. Mr. Cole was formerly an area construction engineer with Chemstrand Corporaat Pensacola.

Samuel A. Scott has joined the staff of International Minerals & Chemical Corporation in Chicago, Illinois as a mining engineer. Mr. Scott previously served as a project engineer for the Colorado School of Mines Research Foundation in Golden, Colorado.

Dr. Richard J. Lund has been promoted to assistant technical director at the Battelle Memorial Institute in Columbus, Ohio. Dr. Lund has been associated with the Institute since 1945. He was formerly director of basic research with the Reynolds Metals Company and was director of the Miscellaneous Minerals Division of the War Production Board during World War II.

Tom C. Oliver has been appointed assistant superintendent of Oliver Iron Mining Division's Gilbert mine near Gilbert, Minnesota. **Wayne E. Tuomie** is now district operating engineer for the Eastern District of Oliver Iron Mining Division with headquarters at Virginia, Minnesota.

Harold C. Ernst, former general pit foreman of Oliver Iron Mining Division's King mine near Coleraine, Minnesota, has retired after 38 years of service with the company. He is succeeded by Charles Beidleman.

E. W. Geist, former director of research in the Hibbing district for M. A. Hanna Company, is now general superintendent of the company's open pit mines in the Michigan district. His jurisdiction includes the new Groveland ore property near Randville, Michigan and the Moose Mountain property in western Ontario, Canada.

Norman Whitmore, owner of Minerals Engineering Company in Los Angeles, California, recently left for Turkey, traveling through South America and Africa. He will visit India and the Philippine Islands on his return trip to examine manganese and chrome mines and mills there.

Parke A. Hodges, vice president of Behre Dolbear & Company, Inc. in New York City, attended the International Minerals Dressing Conference in Stockholm, Sweden as a representative of the Mining and Metallurgical Society of America. Mr. Hodges included tours of iron mines in Northern Sweden and potash mines in Western Germany in his European trip.

George G. Griswold, Jr., a Butte, Montana consulting geologist, recently received an honorary membership in the Montana Society of Engineers. Mr. Griswold developed several flotation processes used in separating complex ores.

James T. Finlen, western general counsel of the Anaconda Company in Butte, Montana, was reappointed to the Natural Resources Committee of the United States Chamber of Commerce. The Committee met in Salt Lake City in September.

Adrian C. Dorenfeld, formerly associated with C. F. Braun & Company in Alhambra, California, has joined the staff of Roberts & Associates with offices at 639 South Spring Street, Los Angeles, California. Mr. Dorenfeld is in charge of all exploration, development, and operating projects of the company.

Dr. George Koch, professor of economic geology at Oregon State College, has been retained by the department to make a study of the mines and surface geology of part of the Granite mining district in Grant and Baker counties, Oregon. Dr. Koch is assisted by **Stephen Pilcher**, graduate student of the College.

Oliver C. Ralston, chief metallurgist of the Bureau of Mines since 1949, retired recently and is now engaged in consulting engineering. Mr. Ralston's successor has not yet been named.

Newsmakers in International Mining

CHARLES J. BROWN was recently appointed sales manager of the Cuban American Nickel Company. Mr. Brown joined Freeport Sulphur Company, the parent organization of Cuban American Nickel, in 1955 and for the past year has participated in the company's new nickel-cobalt project. Cuban American Nickel is constructing a refinery in Louisiana to produce 50,000,000 pounds of nickel and 4,400,000 pounds of cobalt annually from ore concentrates to be produced from deposits at Moa Bay, Cuba.

Henry A. Brimo, president of Philex Mining Corporation, Manila, the Philippines arrived in Japan recently to complete negotiations between Philex and Nippon Mining Company, Ltd. for the sale of copper-gold concentrates. Mr. Brimo also visited a number of copper and zinc smelters and refineries, and other metallurgical plants while in Japan.

C. V. Whitney has been elected to succeed **R. H. Channing** as president of Hudson Bay Mining & Smelting Company, Ltd. of Winnipeg, Canada. Mr. Channing, who has been president of the company since 1931, is now retired. Mr. Whitney was formerly chairman of the board.

Burton H. Boyum, chief geologist for the Cleveland-Cliffs Iron Company in Ishpeming, Michigan, is presently on a trip to South America.

Nalini Ranjan Sen, mining engineer for Tata Iron & Steel Company, Ltd., Jamshedpur, India, toured United States mining operations on the Mesabi range recently.

Duane L. Reber, formerly associated with the Ore Handling Department of Orinoco Mining Company in Venezuela, is now employed with the Reynolds Metal Company in Kwakwani, British Guiana.

A U. S. delegation of metallurgical scientists left for a three-week visit in the Soviet Union recently, as part of an exchange program sponsored by the New York University. The group will visit metallurgical laboratories, plants and institutions in various Russian cities and will attend conferences on metallurgical education and research in the Soviet Union. A similar group of Russian scientists, from the Moscow Steel Institute, will arrive in the United States at a later date to visit metallurgical plants and laboratories and to attend the World Metallurgical Congress held in Chicago, Illinois. The American delegation includes: **Dr. John P. Nielsen**, chairman of New York University's metallurgical engineering department; **Dr. Walter Hibbard, Jr.**, manager of alloy studies, General Electric Company; **Dr. Joseph W. Spretnak**, professor of metallurgy, Ohio State University; **Dr. David Swan**, of the Electro Metals Company, a division of the Union Carbide Corporation; **Dr. Leslie L. Seigle**, associate professor of metallurgical engineering at New York University; **Aron Pressman**, assistant professor of Russian at Washington Square College of Arts & Science; **Dr. Claus G. Goetzel**, senior research scientist, College of Engineering; **J. H. Bechtold**, Westinghouse Electric Company; **Dr. Dennis J. Carney**, division superintendent of Steel Products, United States Steel Corporation; **Dr. Morris Cohen**, professor of physical metallurgy, Massachusetts Institute of Technology; and **Dr. Joseph Hanawalt**, vice president and manager of the magnesium department, Dow Chemical Company.

D. L. Coulter, resident manager of the Connemara mine, a gold mine of the Frobisher, Ltd. group, has made a tour of inspection of Copperbelt mining and milling operations.

William G. Freeman and **David C. McCrillis**, mining engineering students at the McKay School of Mines in Reno, Nevada, have returned to classes after spending nearly three months in Peru, employed by the Cerro de Pasco Corporation. Mr. McCrillis was assigned to the San Cristobal mine in west-central Peru and Mr. Freeman served at the Cerro de Pasco mine in central Peru, in accordance with a student program set up by Cerro de Pasco.

W. J. Nock has been appointed successor to the late **Martin F. Tynan** as assistant general manager of the Mexican Mining Department of American Smelting & Refining Company, with headquarters in El Paso, Texas. **A. F. Horle**, former chief engineer, will replace Mr. Nock as assistant manager of the department.

John Smeddle, former field engineer for Bornite Copper Corporation, Ltd., is now resident manager for the New Formaque Mines in Quebec, Canada.

Nathan D. Adams has been appointed manager of the McIntyre Porcupine Mines Ltd. mine at Schumacher, Ontario, Canada, succeeding **M. L. Urquhart**, who was appointed general manager of the company. **James H. Hamilton** will serve as assistant manager. Mr. Adams joined the McIntyre staff in 1930 and has been employed as mine production engineer, mine superintendent, and assistant manager.

Vincente Fernandez Soler is now employed with the Eugineer of Mines in the District Minero de Leon, Spain as mining engineer. Mr. Soler was previously association with Societe Miniere et Metallurgique de Penarroya, also in Spain.

Jack Kratschman, assistant chief geologist of the Division of Raw Materials, United States Atomic Commission, is head of a group of geologists undertaking exploration operations for uranium ore in Peru. Others in the group are **Lawrence Brown** and **Justine Moses**, geologists, with the U.S. Atomic Energy Commission, and Peruvian geologists, **Oscar Aguilar** and **Victor R. Jordan.**

HAROLD WEDGWOOD (left) has been promoted to assistant manager of Roan Antelope Copper Mines, Ltd. in Luanshya, Northern Rhodesia. Mr. Wedgwood joined Roan Antelope Mines in 1937 and has served as shift boss, mine captain, underground manager, and mine superintendent. ADOLPH SCHUMANN, previously assistant mine superintendent, will succeed Mr. Wedgwood as mine superintendent. Mr. Schumann gained his early mining experience in the gold mines of Witwatersrand, South Africa.

K. C. Acutt has been appointed deputy-chairman of Rhodesian Anglo-American, Ltd. and its associated Bancroft, Nchanga, Rhodesia Copper Refineries, Rhokana, and Rhodesia Broken Hill companies.

J. W. Shilling has been appointed managing director of the recently formed Western Deep Levels, Ltd. The company will develop the ultra-deep levels south of the West Driefontein and Blyvooruitzicht mines in the Transvaal, Union of South Africa.

E. S. Hallett has accepted a position as director of Consolidated Gold Fields of South Africa, Ltd. and New Consolidated Gold Fields Ltd. with headquarters in London, England.

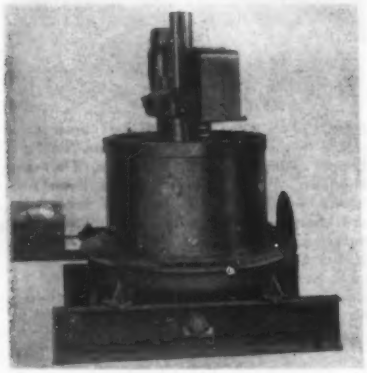
The Winston Spencer Memorial Library has been formally opened in the University of Alaska's Brooks Memorial Mines Building. The late **Winston Spencer**, a mining engineer, was employed by Goodnews Bay Mining Company at the time of his death and the mining company provided funds to establish the library.

Carl B. Jacobs has been elected president of Caland Ore Company, Ltd., a subsidiary of Inland Steel Company, operating at Steep Rock Lake, Ontario, Canada. **Ray D. Satterley** is the new vice president of the company and also manager of the raw materials department of Inland Steel Company. Mr. Satterly has been manager of the steel company's ore operations in the United States since 1953.

D. A. Moddle, provincial assayer for the Department of Mines in Ontario, Canada, has been granted leave of absence to spend one year serving with the United Nations Technical Assistance Board in Burma. He will be stationed in Rangoon, Burma, and will be responsible for the establishment and maintenance of an assay laboratory to be operated by the Burmese government. **W. O. Taylor** will be acting provincial assayer in Mr. Moddle's absence.

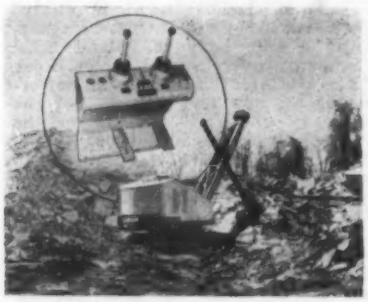
PRODUCTION EQUIPMENT PREVIEW

PEP is just what new equipment, increased mechanization, and new methods can give to your mine, mill or smelter. This PEP section is MINING WORLD's way of making available to you some of the finest current information on mechanization.



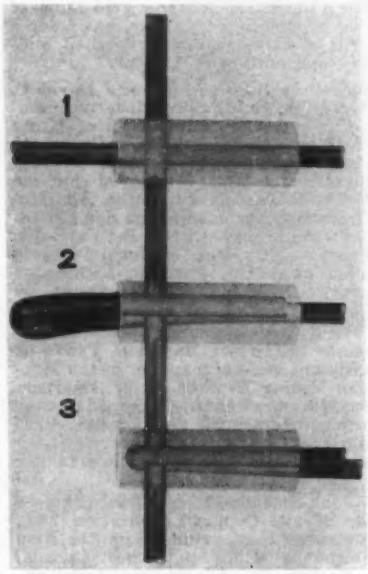
High Capacity Automatic Thickener by Deco

Denver Equipment Company has developed a new high capacity Automatic Thickener with a completely automatic raising and lowering thickener mechanism. This mechanism allows the operator to take advantage of improved flocculating agents for increased rates of settling. With faster settling, less area is required with the advantage of greater economy by using a smaller diameter thickener. When an overload due to gradual buildup of solids occurs, the rakes are automatically raised a small distance where they remain for a predetermined length of time. If the overload persists, this process is repeated until the rakes are finally raised to a point out of the overload area. When the overload is relieved, rakes are automatically lowered in fixed increments until they return to the normal position. For further information write the company at P. O. Box 5268, Denver 17, Colorado. Use handy reader service card.



"Joy-Stick" Controls Available on Lorain-26

Two-lever, "Joy-Stick" power controls are now available on the Lorain-26 a crawler mounted machine with a heavy-duty ¾-yard rating as a shovel and 17½ tons as a crane. This feature controls swing, travel, hoists, crowd and retract, or powering load lowering and boom derricking by hydraulic power. The conventional 3 or more levers are reduced to two and this fact, in addition to the power control itself, reduces operator fatigue, improves control, response and speed of operation. All series of Lorains can now be had with "Joy Stick" power controls. For more information write: The Thew Shovel Co., Lorain, Ohio. Use reader service card.

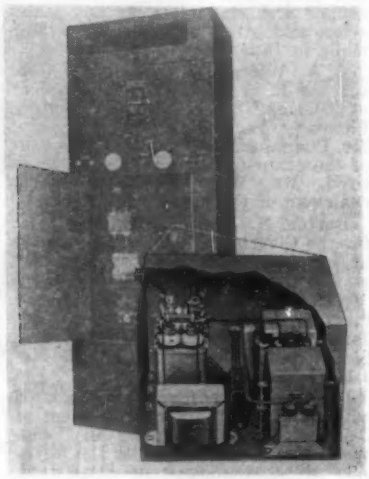


Fuse Connectors Simple But Effective

A plastic connector that is reputed to provide a simple but completely effective method of hooking up detonating fuse preparatory to blasting is announced by Austin Powder Company. When employed for joining trunk and branch lines, the connector is said to assure a positive coupling that won't slip, loosen or lose contact in any weather or under any job condition. It also eliminates tying of knots and the resultant possibility of their becoming untied. For additional information circle No. 58.

New Kind of Bottom Dump Trailer by Athey Products

An entirely new kind of bottom dump trailer now in production is announced by Athey Products Corporation, 5631 W. 65th St., Chicago 38, Illinois. Called the PW20, the new 40 ton capacity trailer has several advances unique in bottom dump trailers. The unit is constructed from the new high-strength high-alloy steel—T-1. Use of this steel greatly increases the trailer capacity in ratio to its own weight. Capacity is 80,000 pounds, almost four times its own weight. Another feature is the rear or third door design. The rear door opens simultaneously with the bottom doors and permits material to flow smoothly out to the rear. For additional information on this new bottom dump unit, write to Athey Products at the above address. Use reader service card.



Automatic Precipitator Control by Western

Western Precipitation Corp., 1,000 West Ninth St., Los Angeles 54, California, have recently developed an automatic precipitator control device. Heretofore in the Cottrell method of electrostatic dust precipitation, whereby charged particles of dust are attracted to metal plates placed in the gas stream, voltage control was done manually. As the amount of voltage which can be impressed upon the gas stream varies from minute to minute, close and accurate control is necessary for efficient operation. As manual control is expensive and not too efficient, Western Precipitation developed an automatic "Transistomatic" Control. This instrument is composed of static parts only, is sealed in a potting compound, and requires no maintenance. The unit carries a lifetime guarantee and assures maximum precipitator efficiency. For further information write to the company at the above address. Use reader service card.

GEOLOGICAL MAPS of every province and territory in Canada are now available from R. A. Brooke, well-known pictographer of Vancouver, B.C. A series of seven maps are available. The maps are complete in geological detail which is supported by complete information and references to Geological Survey of Canada publications. Mineral occurrences are noted on the maps which are colored according to geological age. For additional information write to: R. A. Brooke, 226 Vancouver Block, Vancouver 2, British Columbia, Canada.

UNIVERSAL ENGINEERING CORP. 625 "C" Ave., N.W., Cedar Rapids, Iowa, announces publication of a new condensed catalog on its product line. A 20-page brochure illustrates and gives specifications on their line of crushing, screening, washing, loading, feeding and conveying equipment for the mining industry. Write company at above address for your copy. You'll get your copy faster if you use handy reader service card.

ZIP-AROUND power steering is featured on the new 18-ton "65" or 24-ton "95" International Payhauler off-highway truck, giving them regular pick-up truck spotting ease. Send for complete descriptive booklet on the above units. Cut out, and fill in coupon found on page 40 to receive your free copy.

ALLOY AND STAINLESS STEELS, catalog #175, pinpoints an xcellent reference catalog published by Electric Steel Foundry Co., 2141 N.W. 25th Ave., Portland 10, Oregon. This excellent reference catalog deals with steel products and castings to help solve problems of corrosion, heat, impact and abrasion. Illustrations, tables, and much engineering data, make this an excellent reference book for you. Write the company at the above address for your copy.

SPOIL YOUR DRILL STEEL: In humorous "tongue in cheek" fashion, Atlas Copco reminds workmen there are "Nine Easy Ways to Spoil a Drill Steel" on a 13 by 19-inch poster especially designed for bulletin boards. Clever Cartoons heighten interest. The "don'ts" listed on poster should remind onlookers on the proper care and maintenance of carbide tipped steel. Write company at 930 Brittan Ave., San Carlos, California for your copies.

THREE NEW PORTABLE Diesel Electric Sets have been announced by Caterpillar Tractor Co., Peoria, Illinois. The D311 Electric Set develops 30 KW of 60-cycle, 3-phase current, while the D315 (Series G) Electric Set is rated at 40 KW, and the D318 (Series G) Set at 60 KW. Use reader service card to write company for further information.

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SHAPE DOES IT: This is the title of a new brochure recently released by the Paul E. Keeney Co., 1125 S.E. Grand, Portland 14, Oregon. The Keeney Co. manufactures Rope Master slusher blocks for the mining industry. The brochure gives a thorough description of the complete line of blocks available and also includes much related engineering data. Charts are presented enabling you to quickly select the correct Rope Master Block to perform each job. For your copy, write the company at the above address. Use handy reader service card when replying.

PIONEER FEEDERS: An eight-page bulletin, describing its newly re-designed line of apron feeders has been announced by Pioneer Engineering Division of Poor & Co., Inc., 3200 Como Ave., Minneapolis 14, Minnesota. More than 50 types and sizes of unit feeders and two sizes of portable apron feeders are described. Use reader service card and write company for your copy.

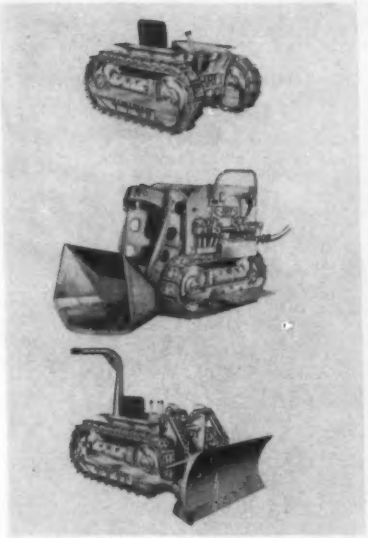
TAPERED ORIFICE VALVE: The General-American Valve Co. have recently developed a new valve for accurately controlling the flow of liquids and gases. The function of the valve is similar to that of a needle valve, but by concentrating all of the flow area in one triangular section it is virtually clog-proof. Circle No. 1 for additional information on this new valve.

BOTTOM DUMP BOOKLET: An attractice new eight-page booklet featuring the Athey PW20 Bottom Dump Trailer is now available. It illustrates PW20 design and application features. For your copy, use reader service card and write Athey Products Corp., 5631 West 65th St. Chicago 38, Illinois for form PW-160.

FILTER CLOTH CATALOG: The National Filter Media Corp., 1717 Dixwell Ave., New Haven, Conn., have recently released a new catalog giving complete data on all types of filter cloth. Fabrics covered include Nylon, Dacron, Vincel, Orlon, Dynel, Teflon and many other special fabrics and special filter papers. Data covers chemical resistance, corrosion and abrasion resistance and available yarn forms. Use reader service card to write company at above address.

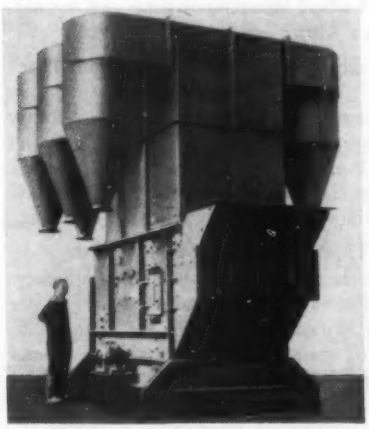
NEW TROJAN TRACTOR SHOVEL: Fast, economical operation that insures peak production with complete safety is the theme of the colorful brochure on the one-cubic yard capacity Model LHM-75 Trojan tractor shovel just issued by the Yale & Towne Manufacturing Co., Contractors Machinery Division, Chrysler Bldg., New York 17, N. Y. For your brochure write company using reader service card.

List information you want MINING WORLD to obtain for you on this card. WE'LL DO THE REST. NO postage necessary if mailed in U. S.



Loader, Tractor, Dozer For Trackless Mining

A new series of crawler equipment for trackless mining consisting of an overhead shovel loader, a bulldozer and a utility tractor has been announced by the Joy Manufacturing Co., Oliver Building, Pittsburgh 22, Pennsylvania. Called the JSL-7 Shovel Loader, JMD-7 Mining Dozer and JMT-7 Mining Tractor, the machines come with either air or electric drive. With separate motors and independent control for each track, one track can run forward and the other reverse to permit gradual or pivot turns or complete reversals within the machine radius. Joy says the equipment can be tailored for the head room or loading heights of virtually any mining system. For free brochure and other data write to the company at the above address. Use handy reader service card.



Crushing and Drying in One Simultaneous Process

The Hazemag Impact-Dryer-Crusher, crushes and dries a wide range of materials in one operation. This new method provides for size reduction by impact crushing and simultaneous drying by hot air or gas introduced into the system. The "Drying-in-the-crusher" process is based on the fact that crushing and drying are complementary operations. Reduction of materials in an impact crusher rapidly increases the surface area and given the intense agitation of the air stream in the machine, enables very effective and rapid drying even at relatively low temperatures. A complete explanatory brochure on the process is available for you. Circle No. 59 for your copy.

Small Skid-Shovel For Underground Use

International Harvester Company recently announced a new 55 hp TD-6 crawler tractor designed exclusively for underground operations. Approved by the U. S. Bureau of Mines, the low five-foot compact unit features the new Drott short-coupled, stainless steel exhaust scrubber that cools exhaust gases to a maximum of 160 degrees while dissolving irritating aldehydes with water-bath turbulence. The new scrubber design also provides blower fan action on the final exhaust which breaks up noxious gas concentration at a ratio of 40 parts fresh air to one part exhaust. Also incorporated in the new model is the Drott Four-in-One, one cubic yard, front-end combination of dozer, clamshell, carry-type scraper and Skid-Shovel. Write company for further information at 180 N. Michigan Ave., Chicago 1, Illinois. Use reader service card for reply.

Rotary and Down-the-Hole Drill by Reich Bros. Co.

Reich Bros. Manufacturing Co., Inc., 1439 Ash St., Terre Haute, Indiana, have developed a new rotary and "down-the-hole" drilling machine. Called the T-750, this one-man, truck mounted drill can exert almost 40,000 pounds on the bit. Infinitely variable rotation provides the right speed for the material being drilled. Sensitive controls, conveniently mounted, enable the operator to apply exactly the right amount of down pressure and rotation speed for maximum penetration by the hammer and bits. Featured also are heavy-duty jacks and semi-automatic stem handling equipment. Write the company at the above address for additional information. Use handy reader service card.

Advanced Forward Control Design does it again! This time it puts a big 9-foot pickup box on a 103½-inch wheelbase. With the engine behind the driver, more cargo space is available for carrying bulky payloads of up to 3500-pounds almost anywhere!

New Forward Control 'Jeep' FC-170 Truck saves more time and money on mining jobs!

"Go-anywhere" 'Jeep' Traction. The all-new 'Jeep' FC-170 Truck, with the extra traction of its 4-wheel drive and wide 63-inch tread, takes the load almost anywhere around the mine with ground-gripping stability. It shifts easily into conventional 2-wheel drive for highway travel at top legal speeds.

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This completely new, more powerful 'Jeep' FC-170 Truck is the only 4-wheel drive truck with so much cargo space per inch of wheelbase. It has unequalled "big-load" maneuverability—takes men, tools and equipment where ordinary trucks can't go. And that's not all! Its 8-inch ground clearance helps prevent "hang-up" in the rough going of mining projects. The bed is only 27-inches from the ground for back-saving ease of loading!

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Southwest Mining Men Gather in El Paso, Texas

The seventh annual International Mining Days meeting was held in El Paso, Texas on November 7, 8 and 9 with approximately 700 members of the Southwest mining industry participating.

The session opened with a talk by Major General W. E. Laidlaw, commanding officer of the White Sands guided missile proving ground in New Mexico. In the afternoon, the present status of copper mining in southern Arizona was discussed by Dr. Eldred D. Wilson of the Arizona Bureau of Mines, and Harrison A. Schmitt, consulting mining geologist of Silver City, New Mexico.

Friday's session was devoted to the discussion of Ambrosia Lake uranium, with technical addresses on prospecting, milling, and mining methods given by R. T. Zitting of Kerr-McGee Oil Industries; R. D. Lynn, geologist for the Anaconda Company in Grants, New Mexico; Clyde Osborn, chief metallurgist, Homestake-New Mexico Partners, Grants; and Ray Schultz, mine superintendent for Hidden Splendor Mining Company, Grants. The final session on Saturday morning included a review of the New Mexico Mining industry by A. J. Thompson, director of the New Mexico State Bureau of Mines and Mineral Resourses.

On the lighter side was the AIME banquet held Friday evening and the Suppliers' Party Saturday night followed by dinner, dancing and a homecoming football game between Texas Western College and Arizona State College. The meeting was sponsored by the New Mexico Mining Association and the mining committee of the El Paso Chamber of Commerce.

Yuba Expansion Planned By New Mining Division

A new mining division has been established by Yuba Consolidated Industries, Inc. of San Francisco, California, which will include the Yuba Consolidated Gold Fields and Portuguese-American tin operations, handle the engineering, manufacture, and sales of mining equipment, and maintain the newly established exploration department.

Yuba has been mining placer gold throughout the west since 1905 and dredging tin in Portugal since 1920. The new division will expand these operations into the mining of other metals, including strategic metals and heavy minerals, and will increase the number of gold and tin developments.

The company's gold mining operations were expected to last another ten years with present reserves, and its tin dredge was scheduled to cease operations late in 1958. However, with the present exploration program in progress, new reserves may be developed.

A study of new areas in Portugal, South America, and the United States is underway, but no agreements have been made regarding these mineral deposits.

The mining division will also expand its engineering facilities and work toward developing and selling various new types of mining equipment.

Alastair H. Robb, manager of the Portuguese-American tin field operation, recently arrived in San Francisco to confer on the expansion program. Clarence G. Carlson is manager of the new division and J. J. Theissen will assist in the exploration activities.

Ray Mines Division, Kennecott Copper Corporation, Ray, Arizona, is maintaining production at the rate of 15,000 tons of ore daily from its open-pit mine. Waste removal is at the rate of 35,000 tons daily. The operation is on a six-day basis with the crews on a five-day work week. Leaching operations in the caved areas of the old underground workings are continuing at about the same rate as last year, the precipitates running about 82 percent copper. Last year the company reported the recovery of 14,934 tons of copper from this phase of its operations, compared to 7,546 tons in 1955.

Ore Concentrates, Inc. is erecting a combined gravity and sink-float plant at Bouse, Arizona, for the treatment of manganese ores. Mill feed will come principally from the *Townsend Blackbird* mine and other local mines. Power for the plant will be provided by a 120- and a 60-kva diesel generator. Arrangements are being made for careful sizing into five sizes with fines to tables and jigs, and coarse to sink-float. The sink-float unit, with a 5 by 5 drum, has a capacity of 800 tons. Dr. Howard E. Smith is head of the mining firm; Tomo Ito, a metallurgist, is mill manager; and Verne C. Haynes, mill superintendent. Company headquarters are in San Diego, California.

Three Arizona mining areas have been designated by the U. S. Forest Service for determination of surface rights. They include: Lower Salt River Valley in the southwest corner of Tonto National Forest and east of the Salt River Indian Reservation; Santa Catalina A area north of Tucson in Coronado National Forest; Timber Camp area of Tonto National Forest in Gila County west of San Carlos Indian Reservation. Mining men may get more complete details at the Federal Land Office in Phoenix.

More than 400 claims have been filed on what may be an important uranium find west of Wickenburg, Arizona. D. H. Brandebury of Santa Fe, New Mexico, a representative of *United Western Minerals Company*, said he had filed 204 claims in a rugged area in the southwest corner of Yavapai County. Mr. Brandebury said commercial possibilities of the find cannot be determined until extensive tests are completed.

Inspiration Consolidated Copper Company has completed metallurgical test work, and designs are ready for recovery of molybdenum from copper concentrate. The completion date for this operation depends upon delivery of machinery, but the company hopes to start production early in 1958. The Morenci mill of *Phelps Dodge Corporation* is the oldest molybdenum producer in Arizona; other molybdenum producers include *Bagdad Copper Corporation* and *Miami Copper Company*. By far the greatest Arizona producer, and the newest before Inspiration, is *San Manuel Copper Corporation*, both because of big tonnage and also because the molybdenum content is fairly high. The highest grade molybdenum by-product mill will be that of *Duval Sulphur and Potash Company* south of Tucson, where mill feed, at times, will be up to three to four pounds of MoS_2 per ton.

Industrial Uranium Corporation is starting production from its Starlight ore body in the Monument Valley district of Arizona. Output from the *Moonlight* mine is averaging about 4,000 tons per month. Two other deposits have not yet been mined, and exploration is also being conducted on several prospects. Since start of mining earlier this year, the company has produced 32,492 tons of ore from the properties, with a gross value of $997,772. In that period, the Navajo Tribal Council at Window Rock, which leases the land to Industrial Uranium, has received $111,200.

Magma Copper Company reports that it is now selling its output from the *San Manuel Copper Corporation* subsidiary to the U.S. government under the terms of its contract with the DMPA negotiated in 1952. The government is paying 27.5¢ per pound (24¢ floor price and 3.05¢ for escalation). Comparable average market price is now about 26.4¢ per pound, f.o.b. Atlantic refineries.

Western Exploration and Development Company of Phoenix, Arizona, is employing a crew of 40 men in its manganese operations in the Cibola district of Yuma County. The principal properties being worked are the *Black Jack*, *Tenny*, *Gibson*, *Black Diamond*, and *Rosy*. All mining is by open pit using two RD-8 Caterpillars, a 2½-yard shovel, a yard Traxcavator, and a couple of slushers. Some stripping is necessary. The ore is trucked a distance of 9 to 12 miles to the company's mill for concentration. The mill consists of a grizzley, Gates jaw crusher, screen system, Traylor cone gyratory crusher, sink-float machine, magnetic separator, and seven tables for gravity concentration of fines. A concentration ratio of 4 or 5 to 1 on manganese and silica is obtained. The plant produces about 10 cars of 40 to 44 percent concentrates per month. V. E. Spicer of Ripley, California, is superintendent of operations; Lewis W. Smith, Blythe, California, is chief engineer.

The *Chaparral Mining Company* has leased six unpatented iron ore claims near Young, Arizona from A. D. Williams and Glenn Ellison. Under terms of the agreement, Chaparral has an option to buy the *Iron Dog* group for $50,000. Royalties of not less than $50 monthly started immediately, plus 20¢ per ton on all iron ore sold and eight percent royalties on all other ores marketed. If Chaparral exercises its option to buy, the royalties will be deducted from the purchase price.

Rare Metals Corporation of America has purchased controlling interest in the lease of the *Altoona* quicksilver mine in Trinity County, California. Bert C. Austin and L. A. Smith who sold their lease to Rare Metals had spent two years rehabilitating the mine. It is expected now that Rare Metals will install a mill at the site. The Altoona was closed in 1902 after

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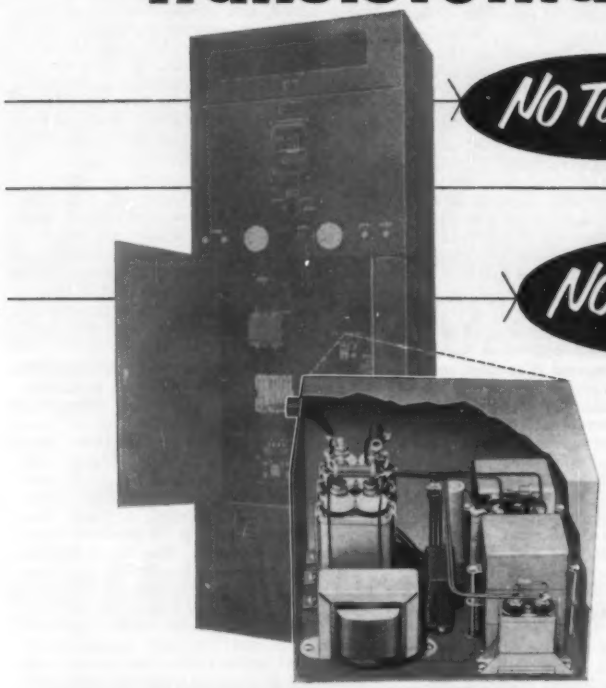

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NEVADA

New Park Mining Company and *East Utah Mining Company* have formed *Yale Gold Mining Company* to reopen the old *Elko Prince* mine in the Midas district of Elko County, Nevada. The new firm is reported to have made arrangement with *Miners Gold Mining Company* which owns adjoining property to enter the Elko Prince through an existing tunnel in the Miners Gold property. The shaft of Elko Prince has caved in and it would be cheaper to extend the Miners Gold tunnel as an entry way.

Mineral Materials Company has placed a new magnetic iron ore separation plant in operation at its mine 30 miles east of Lovelock, Nevada. The plant has a capacity of 300 tons per hour, but initially will operate on only a one-shift basis. The processed ore is trucked to the Mineral Materials siding and loading plant at Colada. Most of the firm's ore goes to Japan, but domestic markets are being sought. Lovelock's iron shipments are steadily increasing. In September 410 carloads were moved, most of it going to the Port of Stockton, California for later shipment to Japan. Among the other shippers are *Dodge Construction Company, Bradley & Ekstrum, Nevada Iron Ore,* and *Heizer.*

A large-scale drilling program is scheduled for the *Monarch* uranium claims, 26 miles north of Tonopah, Nevada. An unidentified Texas firm will do the work under a farm-out agreement with *Sunburst Uranium Company* of Portland, Oregon. There has been no surface exploration; *Geo-Resource Corporation* of Washington did some drilling to confirm a uranium-ore body located through geophysical prospecting.

N. G. Baxter reports that he discovered an argilloceous limestone deposit about 12 miles from Lovelock, Nevada which is large enough to support production of 250 barrels of cement daily. A company reportedly will be formed, with Robert J. Carlson as president, to build a plant and mine the ore.

Nevada Scheelite Division of *Kennametal Inc.* has closed down its mining and milling operations at its property in Mineral County, Nevada but a plant for production of tungsten carbide has just gone into operation. Initial output will be about 20,000 pounds of tungsten carbide per month. Concentrates produced by the company's operations prior to cessation of activities will be used in the plant; other tungsten concentrate will be purchased.

Consolidated Coppermines Corporation has made its first major layoff by eliminating the graveyard shift at its operations at Kimberly, Nevada. The low price of copper and the high labor costs are cited as the reasons for the cutback.

The *Mercury Corporation of America* has opened a branch office in Lovelock, Nevada in order to continue investigations in Pershing County. The company has acquired control of *National Mercury Corporation* which owns the *Pershing* quicksilver mine, 23 miles east of Lovelock, and National Mercury will move its central office from Denver to Lovelock.

Sundown Petroleum Company has started stripping operations at its property near Panaca, Lincoln County, Nevada where drilling has disclosed a uranium ore body. Additional drilling is being undertaken to block out the deposit. Shipments will be made to *Vitro Uranium Company's* processing mill in Salt Lake City; amenability tests have already indicated that the ore can be successfully treated there.

United Mercury Corporation, operating about 65 miles southwest of Battle Mountain, Nevada, has reduced its flotation plant operation to one shift per day. Lack of water is said to be the reason for the reduction. This problem is to be remedied by construction of a rotary furnace.

The Mountain City district of Elko County, Nevada has been the scene of recent uranium discoveries. Thomas White and associates are working the *Race Track* group of claims, and they also hold an adjoining 15 claims known as the *Lucky Lager* group. *Mountain City Uranium Company* owned by local men, including Milt Ray and Ed Gregory, have a good showing of torberni'e about three miles up California Creek. Mr. White, together with Mr. Ray and Mr. Gregory, owns the *Hot Spot* group, also near Mountain City. *Continental Oil Company* did some drilling on the latter property recently but results have not been revealed.

SOUTHWEST

Eagle-Picher Company has authorized *Kaiser Engineers* to perform detailed engineering plans and specifications for a new diatomaceous earth processing plant at Lovelock, Nevada.

NEW MEXICO

Actual signing of the $10,000,000 contract for construction of a uranium mill by *Utah Construction Company* for the *Homestake-Sapin Partners* near Grants, New Mexico has confirmed a conditional agreement. Work on the 1,500-ton-per-day plant is already under way. Utah will also construct related surface facilities and sink several shafts for the mining operation. The ore will come from Homestake-Sapin properties in the Ambrosia Lake area and from other producers in the district.

The uranium ore body *Rare Metals Corporation of America* has been delimiting in the Ambrosia Lake area of McKinley County, New Mexico now contains in excess of 800,000 tons. The ore has a grade of about 0.24 percent U_3O_8, and is about 1,000 feet below surface so the mining will probably be by underground methods. Consideration is being given to erection of a mill on the site. The properties are leased from William Denvers of Salt Lake City.

Utah Construction Company is reported to have obtained a 10-year lease for industrial development of Navaho Indian land in the area south of Shiprock and Farmington, New Mexico. Utah will mine coal and other minerals found with coal over 24,320 acres. A royalty of 15¢ per ton will be paid for coal mined, and 10 percent royalty on smelted metals found with the coal. Uranium royalty will run from 12 to 25 percent. The firm reportedly plans to mine a strip of land 25 miles long, and from one to three miles wide. A plan for development of the area must be presented within five years.

By the middle of October, *McKenzie & Whittle*, contractors for the sinking of the 1,700-foot shaft of *Farm Chemical Resources Development Corporation*, had completed the 15-foot, inside-diameter, concrete-lined shaft to a depth of 1,385 feet without a single accident causing a man to lose time. The shaft is to be completed by the end of the year and will be New Mexico's seventh potash mine. Location is 30 miles northeast of Carlsbad, New Mexico.

The *Molybdenum Corporation of America's* 50-ton-per-day flotation mill on its *Questa* property in Taos County, New Mexico has been treating tailings recently. The mill has been operated on a non-continuous basis for the past few years, producing molybdenum sulphide concentrates from ore and tailings. This time only the tailings are being treated and it is not known whether these operations will be sufficiently profitable to warrant their continuation. The company is exploring the property under a DMEA loan of $510,500. The 30-month program started June 15, 1957, and the government will advance up to $255,250. Molybdenum Corporation mined the property from 1923 until July 1956. Ore during this period was from many small high-grade veins.

DMEA Assists ASARCO In East Page Project

A new deep exploration project, estimated to cost $660,206, has been started in the Coeur d'Alene mining region of Shoshone County, Idaho, by American Smelting and Refining Company. The Defense Minerals Exploration Administration approved a lead-zinc exploration program for that amount at the company's Page mine west of Kellogg. A 5,700-foot lateral, crosscuts and diamond drill holes will explore virgin ground easterly from the 3,070-foot level toward the Bunker Hill mine. The project will take an estimated five years.

Federal To Operate Idaho Ag-Pb-Zn Claims

The old Hewer and Keep Cool silver-lead-zinc mines in the Lakeview area of Pend Oreille mining district, Bonner County, Idaho, will be operated by Federal Uranium Corporation of Salt Lake City, Utah under an agreement with Idaho Lakeview Mining Company of Spokane, Washington. Federal Uranium will get 60 percent of profits after recovering development costs.

Work will be determined by results of current drifting on the new 700-foot level of the adjacent Conjecture mine and downhole diamond drilling planned below that level. Conjecture ore bodies have been improving both in length and grade with added depth and Federal Uranium has made preliminary plans to sink a new three-compartment vertical shaft to a depth of at least 1,000 feet. A 4,000-foot tunnel would gain considerable depth below Keep Cool workings because of the Conjecture's 1,600 feet lower elevation.

Both the Keep Cool and Hewer have had intermittent production for many years. The Hewer, equipped with a 100-ton flotation mill, at one time was owned by Consolidated Mining and Smelting Company of Canada. Ralph W. Neyman is Federal president and Jerome L. Drumheller heads Idaho Lakeview.

J. R. Simplot Company of Boise, Idaho has set June 1 as a target date for starting construction of a $750,000 to $1,000,000 test plant in Latah County's Bovill area to upgrade clays for use in ceramics, insulators, and paper. Silica by-product would go to glass and enamel makers. Plant design work now is under way.

Exploration and development of the *Heinze* lead-silver-zinc-cadmium property adjoining the *Clayton* silver mine in Custer County, Idaho's Bayhorse district has been undertaken by *H. & H. Exploration and Engineering Company* of Grand Junction, Colorado. The owners, Lawrence Gini and Douglas Farmer, retained a royalty interest. A property survey has been made and a core drill moved in. Plans include rehabilitating No. 12 drift and extending it.

Clayton Silver Mines' Custer County, Idaho operation continues at mill capacity of 110 tons daily. Shaft deepening is progressing at about one foot a day, and it has passed the 700-foot level en route to a new 850 level. Twenty-seven men are employed, including three supervisors.

The *Anaconda Company* has been mining alumina-bearing clay from a test excavation near Moscow, Latah County, Idaho, and shipping it to Anaconda, Montana for future testing in a $1,000,000 pilot plant designed to recover the alumina. Testing of the plant is scheduled for some time after January 1. If results are satisfactory, a $45,000,000 recovery plant would be built in the Moscow area.

A mucking machine, heavy rail, and ventilating system have been installed at the *Iron Mask Mining Company* property, Talache District, Bonner County, Idaho, to speed operations. The firm is driving a new main adit into Blacktail Mountain to open a silver-copper vein beneath the outcrop and permit stoping operations. R. J. Evans is vice president in charge.

In the Seafoam district of Custer County, Idaho, *Seagraves Mining Company* suspended work for the winter after constructing a new access road and uncovering a face of good ore. Work is scheduled to be resumed in the spring. Carl Wattier and D. Warner, both of Portland, Oregon, are president and secretary, respectively.

Uranium-thorium mineralization has been discovered on West Mountain near Cascade, Valley County, Idaho, by Wayne Waggoner, John Merell, and Bill Jones, all of Weiser. The partners staked 10 claims and began development work.

Jake and Jack Albert of Kooskia, Idaho have been testing a portable suction gold dredge they built for use at Pheney Bar on the Snake River. Capacity is expected to be about 10 cubic yards of gravel an hour.

An unexpected vein of lead-zinc ore has been found at the old *Black Bear* mine at Gem, Shoshone County, Idaho in tunneling around a caved area. *Black Bear Silver-Lead Mines Company* is reopening the mine with funds supplied by *Metropolitan Mines Corporation* of Wallace.

High-grade lead ore with good silver values is being exposed is westerly drifting on the *Silver Syndicate* vein at a depth of 4,000 feet on Big Creek, Shoshone County, Idaho. At the eastern end of the East shoot, a raise is being driven to the 3,840-foot level in preparation for stoping. *Sunshine Mining Company* is the operating firm.

The *Fuesner Mines Company* whose property is located approximately 25 miles east of White Sulphur Springs, Montana, is reported to be constructing a mill to concentrate manganese ore from the property. Good grade oxidized manganese ore has been discovered close to the surface and it is mined by open-pit methods.

Ray Crumb, owner and operator of the *Humdinger* mine near Avon, Montana, is doing some surface excavating to determine the attitude of a vein exposed in certain places on his property. Mr. Crumb recovers gold from the ore by

First Thorium Shipment Made from Northwest

The first shipment of thorium concentrates from the Northwest was made recently by Northwest Prospecting & Development Company of Spokane, Washington. The 2,000-pound shipment, consisting of 900 pounds of concentrates assaying 31.44 percent thorium oxide and 1,100 pounds of middlings assaying 0.386 percent thorium oxide, was sent to a Tennessee firm which produces thorium and rare earth chemicals. The concentrates were obtained from 26 tons of thorite mined at the company's property on Hall Mountain, near the Washington-British Columbia border. Ore was blasted from a hillside vein and transported 300 miles to the J. D. Drent tungsten mill at Hall, Montana. Only a few mill adjustments were necessary, including installation of finer screens. It is reported that if sufficiently large purchase orders for the concentrates are obtained, the mill will be moved to property in northern Idaho. Pictured above are mining activities on the Hall Mountain. The bulldozer is used for stripping the mountainside prior to blasting. Northwest Prospecting & Development Company was formed more than a year ago to develop thorium-uranium deposits at the old Golden Sceptre gold mine and adjoining claims on Hall Mountain.

running it through a small stamp mill located on the property.

Hamilton Mines Inc. is doing some exploration work on the old *Yellowstone* mine near Lennup, Montana. This work consists of extending a partially driven crosscut to tap the old workings at depth.

A second and lower tunnel is planned at the *Lucky Joe* uranium prospect on the West Fork of the Bitterroot River, Ravalli County, Montana. Crushing and sorting machinery were erected in portable form in anticipation of such a move. The project is a joint venture of *National Uranium Corporation* and *Hypotheek Mining and Milling Company*, both of Wallace, Idaho.

Golden Anchor Mining and Milling Company has started milling gold-silver-lead ore at its property near Elliston, Montana. Plans called for winter operations on a one-shift basis and addition of two more shifts in the spring. A gravity concentrator is in use. A grinding unit installed in 1956 had to be returned to the manufacturer for modifications. Henry L. Newmiller of Elliston is president and manager.

A 100-ton selective flotation concentrator has been completed to mill lead-zinc-silver-gold ore at the old *Snowshoe* mine near Libby, Montana. Rehabilitation of mine workings has disclosed about 12,000 tons of ore available for milling. Total reserves of blocked out and probable ore are estimated at 283,000 tons. Smelter returns are expected to be about $31 a ton and operating costs about $13.50 a ton. *St. Paul Lead Company* of Kellogg, Idaho, and *Merger Mines Corporation* of Coeur d'Alene, Idaho, are partners in the venture.

The *Uranium Corporation of America* has reopened the old *Daly* mine, located in Wickes, Montana, to the bottom level. Clean-up work and exploratory work are now being carried on to determine the amount and the extent of the mineralization.

The East Helena, Montana plant of *American Smelting and Refining Company* has been processing about 23,500 tons of ore monthly, with values mostly in lead, gold, and silver. Shipments are from many countries, including Canada, Australia, Korea, and South America. About 270 are employed. Joseph T. Roy is manager.

OREGON

Orion Exploration and Development Company has received Defense Minerals Exploration Administration approval of a $12,100 contract for exploration of a mercury deposit at the *Log Cabin, Ridge,* and *Camp* claims in Crook County, Oregon. Government participation will be 75 percent. Work will include trenching and diamond drilling. Dave P. Westbrook of Prineville is company secretary.

Chemical Lime Company of Portland has started production at a new $2,000,000 plant near Baker, Oregon. Plant capacity is 75,000 tons of chemical lime yearly. Future plans include construction of a dry ice plant to utilize by-product carbon dioxide.

WASHINGTON

Geo-Resource Corporation is planning exploration at depth below a surface showing of autunite uncovered by bulldozing on land north of the Spokane Indian Reservation, Stevens County, Washington. The site is leased from *Universal Mining Corporation* and adjoins a section leased from *Grandview Mines, Inc.*, and being drilled by Geo-Resource under a $45,000 contract with the Defense Minerals Exploration Administration.

Dahl Uranium Mine, Inc., at last report, was stockpiling autunite at its *Dahl* lease in the Mount Spokane District, northern Spokane County, Washington. An initial shipment was to be made to *Dawn Mining Company's* new uranium processing plant at Ford, Washington as soon as 500 tons had been accumulated. Fred Pulley is superintendent.

Highnoon Uranium Mines, Inc. has received a milling contract from the new Ford, Washington uranium processing plant and at last report was preparing an initial shipment of autunite from its *Lost Creek* claims in Pend Oreille County. A four-mile hauling road was built and a 100-ton ore bunker constructed. C. N. McJunkin of Hermiston, Oregon is president and field manager.

Two new ore zones have been found by *Clayloon Uranium Company* on the *Huffman* lease in the Mount Spokane district, sub-leased from *Daybreak Uranium, Inc.* One was found by bulldozing and the other by downhole drilling. Byrl T. Goodwin Jr. of Spokane, Washington is president.

Diamond drilling is scheduled by *Grandview Mines, Inc.* at the *Scandia* mine, Northport district, Stevens County, Washington, under a $15,670 zinc exploration contract extension granted by the Defense Minerals Exploration Administration. The DMEA contract now totals about $53,000.

Renewed Mining Interest in Southern Missouri; At Least 20 Companies Now Producing Iron Ore

Missouri iron ore, once considered unprofitable to market, is experiencing one of the largest mining booms ever to occur in the state. Current mining activity is centered in Howell and Oregon counties near the Arkansas border where 20 mining companies are engaged in open-pit operations. Drilling for new deposits is also in progress in counties further north and an extensive underground project involving production estimates of 2,000,000 tons annually is developing in Franklin County.

One reason for the boom is that Missouri ore makes a good blending agent for improving the quality of other ores. While high in impurities, it is generally low in phosphorus content and when blended with ores of other ranges, Missouri ore reduces the overall phosphorus percentage at the mill.

Most of the output is coming from small-scale operators who mine from 200 to 500 tons per day. One of the largest of these is the Plateau Mining Company which is working near Koshkonog, Missouri. Recently exploratory drilling on the floor of the open pit (pictured below) disclosed the presence of ore to an additional depth of 75 feet.

Ore is shipped by the most operators from the rail center at West Plains to steel centers at Birmingham, Alabama, Nashville, Tennessee, and Granite City, Illinois. In 1956, railway bills of lading showed 130,000 tons of iron ore had been shipped from the West Plains area, twice as much as that mined in the entire state in the previous year.

Most mining operators rely on Diesel engines to drive their equipment which includes shovels, washing plants, and deep-well water pumps. As the ore is generally found in small pockets rather than in continuous veins, frequent moves of equipment are necessary.

The lean ore content of some Missouri deposits requires dressing down the ore before it is shipped. Washing plants rely on the simple agitator action of two large rotating augers mounted horizontally in a water tank below the hopper to remove red clay and other impurities. About 25 percent of the material trucked from pit to washing plant emerges as good ore.

Water consumption on some plants is as high as 40,000 gallons of water per hour. In areas where there is no natural water supply, reservoirs must be constructed to insure ample water supplies. Some miners must employ Diesel-powered deep-well pumps around the clock to replace water in the reservoirs lost through use and evaporation.

Settling ponds formed by man-made dikes are maintained on several mining sites to help conserve the water supply. The ponds are strategically located down hill from the washing plant so as to trap the used water until impurities have settled. Water is then returned to the reservoir through overflow locks for reuse.

Men of the Missouri iron range are do-it-yourself advocates who cut and maintain their own access roads and build and engineer their own washing plants. Typical of the operators is Wade Miller, a former sawmill operator, and Howard Reynolds, a garage repairman. Three years ago the two men leased a 40-acre tract of land near Koshkonog, with only $2,500 between them. They recently sold their mining interests there in favor of starting up at a new location and were paying $2,200 per month in royalties alone to the owners of the land. Their new washing plant is pictured below.

The first of two large shafts on the *Pea Ridge* iron ore deposit in Missouri has been started by *Meramec Mining Company*. This is to be a 3,000-foot exploration shaft. Meramec was formed by *St. Joseph Lead Company* and *Bethlehem Steel Corporation*.

Kaiser Aluminum & Chemical Corporation has placed its ninth potline in operation at its reduction plant in Chalmette, Louisiana. The additional capacity of 27,500 tons of primary aluminum brings to 247,500 tons the annual capacity of this plant. The company's overall output is 462,000 tons. The additional installation cost about $15,000,000.

Bear Creek Mining Company, with offices in Minneapolis, Minnesota, has applied for exploration leases in various areas of northern Wisconsin, including Douglas County. Bear Creek did extensive exploration in the Kawishawi River area of northern Minnesota during the past few years. The firm is a subsidiary of *Kennecott Copper Corporation*.

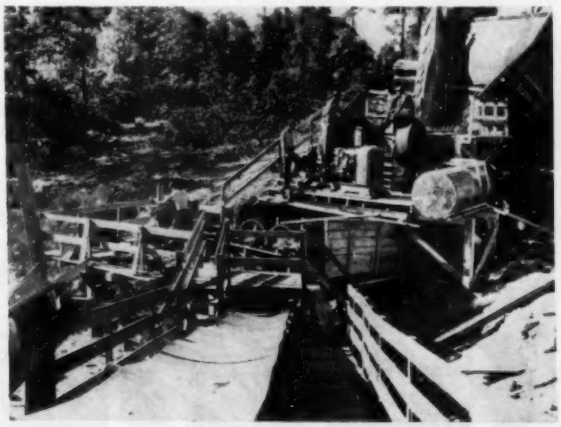
Kennecott Copper Corporation has agreed to purchase from the *Baltimore & Ohio Railroad* a 200-acre tract of land in Anne Arundel County, Maryland. The land will be the site of a new $20,000,000 electrolytic copper refinery. Plans call for initial monthly capacity of 7,000 tons of electrolytic copper and for operations to start in 1959. There will be two main buildings, an office building, a warehouse, and service installations. Project manager will be Ivor G. Pickering who has been chief design engineer for Kennecott's Western Mining Division engineering department; John D. McIver will be project engineer.

The DMEA has loaned $85,063 to *National Lead Company* for zinc exploration in Grainger County, Tennessee. The entire exploration program is expected to cost $170,125. National Lead already has several barite mines operating in the nearby Sweetwater barite district. In these barite mines, zinc occurs only as a minor byproduct. The barite mined is of chemical grade.

The first electric arc furnace in the first unit of *Vanadium Corporation of America's* new low carbon ferro chromium alloy plant at Vancoram, Ohio has been energized. Present plans call for production on a commercial basis from all five furnaces by the end of this year.

General Electric Company expects to move from pilot plant production of man-

A ¾-yard Link Belt shovel, powered by 4-71 GM Diesel engine, is visible in pit of Plateau Mining Company loading ore for trucking to washing plants. Shovel must handle four truck loads of pit material to produce equivalent of one truck load of washed ore.



Wade Miller and Howard Reynolds are completing erection of a new washing plant in Oregon County, Missouri. Diesel engineer at left installs a 127-hp. GM Detroit Diesel engine on plant's washing system while welders assemble 24- by 36-inch Lippman jaw crusher.

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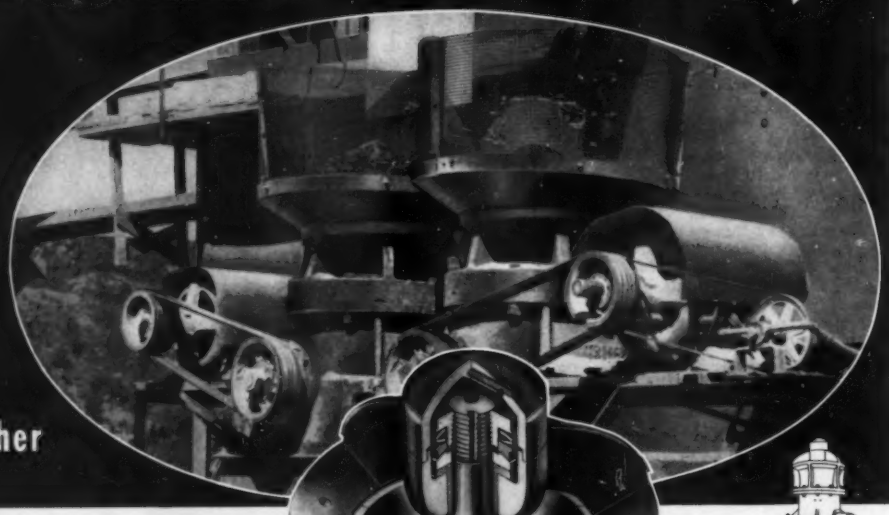

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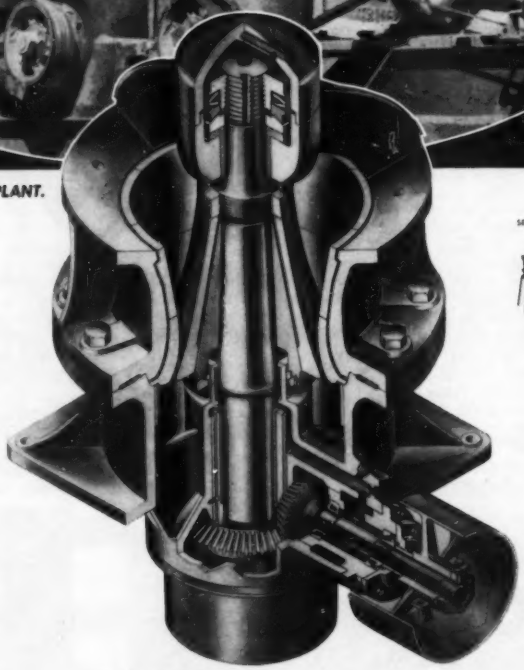
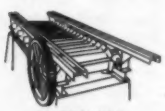


TYPE TY CRUSHER (quarter-section cut-away view)

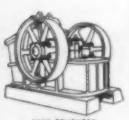
This view shows all the sound structural features that make it the outstanding secondary reduction crusher in its field.

SECONDARY GYRATORY CRUSHERS

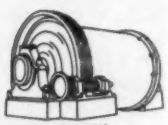


APRON FEEDERS

PRIMARY GYRATORY CRUSHERS



JAW CRUSHERS



BALL MILLS

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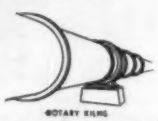


ROTARY KILNS

made industrial diamonds to a commercial basis in 1958. More than 100,000 carats of these synthetic diamonds have been produced by GE and it is hoped that next year annual output can be increased to 3,500,000 carats. This would be about half of the country's requirements; about 7,000,000 carats were to be imported in 1957.

The United States has accepted an invitation by the United Nations to participate in the Second International Conference on Peaceful Uses of Atomic Energy, to be held in Geneva September 1 through 13, 1958. The AEC has established an Office for International Conference to plan and coordinate the AEC's participation in the conference. MINING WORLD readers are cordially invited to submit names of authors, titles, and abstracts of technical papers for consideration for submission to the Secretary-General of the U.N. Abstracts of no longer than 500 words should be mailed to the Technical Director, Office for International Conference, AEC, 1901 Constitution Avenue, N.W., Washington 25, D.C., no later than January 1, 1958.

Tennessee Copper Company's Boyd mine at Copperhill, Tennessee, completed three years of work without a lost-time accident on October 14. It was the first time that one of the firm's mines had gone so long without an accident causing loss of time from the job. During this period more than 1,500,000 tons of ore had been mined, 636,000 man-hours had been worked, and about 16,950 feet of drifts and raises had been driven underground in the Boyd.

The United States Supreme Court has upheld the decision of a lower court that mine owners may take depletion allowances on income derived from manufacturing or other non-mine activities directly related to mine operations.

A consent judgement has ended the Federal antitrust suit against *American Smelting & Refining Company*. The company has agreed not to enter into any price fixing agreements, and specifically not to exchange price information with *St. Joseph Lead Company* whose antitrust suit with the government is pending. ASARCO must not acquire any domestic lead smelter or refinery for the next 10 years. The judgment restricts the amount of lead ASARCO may refine for St. Joe; prohibits restrictions of amount of lead St. Joe may refine for itself; and requires court or Justice Department approval for all lead refining ASARCO does for St. Joe over the next seven years. American Smelting cannot enter into any agreement to limit the production of lead in the U.S.; cannot be a party to any cartel agreement to restrict U.S. imports or exports of lead; and it cannot enter into any toll contract for smelting or refining lead that would close down the operations of any lead smelter or refinery not owned by the company.

The *International Nickel Company* has established a Chair in Chemical Metallurgy at Columbia University. In making the $350,000 grant, together with a gift of $75,000 for special expenditures incidental to the establishing of the Chair, Henry S. Wingate, president of Inco, explained that the company wishes to support fundamental research in the surface chemical and physical aspects of many problems in mineral beneficiation and extraction metallurgy. The University Trustees have designated the new Chair as the Stanley-Thompson Chair of Chem-

ical Metallurgy in honor of two outstanding alumni of Columbia's School of Mines who were also chief officers of Inco.

IRON RANGES

The new *Stephens* mine of *Oliver Iron Mining Division, U.S. Steel Corporation,* Aurora, Minnesota, continues to supplement Oliver's production. Since July 1, 1957, shipment of ore has totaled approximately 1,500,000 gross tons (to October 1, 1957). The total estimated reserve tonnages at this mine amount to 47,000,000 tons. Overburden varies from five to 40 feet of surface stripping and the ultimate mining area will be approximately 6,000 feet in length, 5,000 feet in width and 250 feet in depth.

Erie Mining Company's commercial taconite plant has started break-in operations. At present, two of the concentrator sections and two pelletizing furnaces have been placed into operation at a reduced tonnage. They expect to have the complete plant operating by mid-winter with a large tonnage of concentrates scheduled for 1958.

Winter shutdown operations in the various iron ore treatment plants on the Mesaba Range is almost complete. Some of the plants ceased operation earlier than in recent years. The apparent slowdown in steel production created these early plant "wash-outs." Through the week ending October 21, cumulative ore shipments totalled 77,004,737 gross tons of ore for 1957, comparing to 63,000,459 gross tons to a like date in 1956.

M. A. Hanna Company has started stripping of the *Musser* mine near Ironton, Minnesota. The mine will enter ore production at the start of the 1958 ore season. Hanna is doing surface and rock stripping at several mines on both the Mesabi and Cuyuna Ranges in Minnesota and at the *Groveland* mine in Michigan this winter. Underground operations in Michigan are following normal patterns. At the *Iron Mountain* mine in Missouri, installation and movement of equipment in the mine has been taking place during late fall and early winter. Normal operations will resume after the first of the year.

Oglebay, Norton & Company has merged with nine other firms if stockholders approve the action. Joining in the merger are *Montreal Mining Company, Columbia Transportation Company, Ferro Engineering Company, Pringle Barge Line Company, Saginaw Dock & Terminal Company, Richwood Sewell Coal Company, Fairport Machine Shop, Inc., North Shore Land Company,* and *Standard Box Company.* The merging companies are engaged in iron ore and coal mining, lake vessel transportation, dock operations, the sale of coal, ores, slag, and other raw materials, and industrial supplies, as well as the production and sale of "C&D" hot tops and operation of a machine shop specializing in vessel repairs. The new Oglebay Norton Company would continue in the operation of iron ore and coal mines and dock facilities for companies not a part of the merger and for whom the company acts as manager or sales agent.

AEC Announces Plan To Limit Future Expansion of Domestic Uranium Production

"It would be undesirable from the standpoint of industry, as well as government, to expand the uranium production rate beyond currently projected requirements and then be faced with a major curtailment at some later date," said Jesse C. Johnson, director, Division of Raw Materials of the United States Atomic Energy Commission, on October 28th.

He hastily added that, while the Commission is faced with limiting commitments for additional domestic uranium production, proposals for domestic mill contracts which have been submitted and are under review still "will be considered in the light of discussions which have taken place."

There is still some chance for new mill contracts under special circumstances, he said, "If new contracts are considered, preference will be given to providing a limited market for areas having no present milling facilities." He then warned that, "Extensive development of new areas should not be based upon the assumption that there is a current market for all the uranium that can be produced."

Clarifying the situation in regard to foreign uranium, Mr. Johnson said, "As for foreign purchases, no new commitments have been made for several years."

The big change in the Commission's policy is largely due to one district—Laguna-Ambrosia Lake, New Mexico—where ore reserves are now approaching the 50,000,000-ton mark. Ambrosia Lake accounts for 30,000,000 and Anaconda Company's Jackpile mine, the balance. So important is this New Mexico Ambrosia Lake district that if an area that could be included in a circle with a 15-mile radius were eliminated, the available uranium ore supply would last only three years at the 1959 production rate.

To demonstrate the rapid growth rate of ore reserves in the United States, Mr. Johnson supplied the following figures. In October, domestic ore reserves were estimated at 70,000,000 tons averaging about five pounds of uranium oxide per ton. In June of this year, reserves were set at 67,240,000, and the largest portion of the 2,760,000-ton increase is in the Ambrosia Lake district. A year ago reserves were 60,000,000 tons, two years ago, 25,000,000, three years ago 10,000,000, four years ago 5,000,000, and in 1948 estimated reserved had just reached the 1,000,000-ton mark.

One of the surprises of the past few years, Mr. Johnson said, has been the size of sedimentary-type deposits and the extent of ore reserves developed in areas with no significant surface exposures. Because of the exposure of the sedimentary beds by erosion, it was expected that surface outcrops would give more accurate indications of the size and extent of uranium resources. However, major deposits in the Big Indian Wash district in Utah, Wyoming's Gas Hills district, and the Ambrosia Lake field were discovered by drilling. And as private drilling campaigns have expanded, ore reserves have increased rapidly.

Although no average figure for mining costs is available because of the wide range in size and type of operations, Mr. Johnson disclosed some estimates in regard to production costs. In large, well mechanized underground mines such as those located in the Big Indian Wash district, a representative figure for mining cost would be about $11.00 per ton. In the Uravan district of Colorado, where production is about 1,700 tons of ore per day, mining costs may average $20.00 per ton. Another important underground mining area, the White-Canyon-Monument Valley district of Utah, has not yet reached full production but experience indicates mining costs will average about $16.00 a ton.

Ore produced by open-pit methods shows a slightly lower cost because the capital investment is smaller. Most ore now produced from open-pit operations may involve a cost of approximately $8.00 a ton.

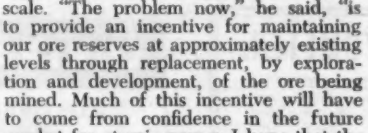
Milling costs range from $8.00 to $15.00 per ton for the smaller mills and $7.00 to $10.00 for the larger mills. If vanadium is also recovered at the mill, $5.00 to $8.00 should be added for an over-all processing cost per ton.

Two other influential cost factors are capacity and chemical costs. Chemical costs for a regenerative sodium-carbonate circuit will usually range from $1.50 to $2.50 per ton. For acid circuits, the chemical costs will vary from $2.00 to as high as $7.00 per ton, depending on the cost of acid consumption in leaching. The cost of building a uranium ore processing plant in the United States varies from $5,000 to $10,000 for each ton of daily capacity. The amortization charge would be from $2.80 to $5.50 per ton, assuming five years for amortization.

Prices paid for domestic ore concentrate, according to Mr. Johnson, are based upon an estimated normal grade of mill-feed, and may vary with the grade of millfeed. The average price paid in 1956 was $11.60 per pound. The estimate for 1957 is $9.60 and for 1959, $9.30. In comparison, the average price paid by the Commission for foreign concentrate in 1956 was $10.90 per pound, in 1957, $11.15. The estimate for 1958 is $11.15 and for 1959, $10.70. All contract prices are negotiated on estimated costs of production or relate to audited costs of production.

Domestic concentrate is now produced at the rate of approximately 10,000 tons of uranium a year. It is expected to increase to 15,000 tons or more by 1959.

Mr. Johnson emphasized that the United States should continue uranium exploration and development on a large scale. "The problem now," he said, "is to provide an incentive for maintaining our ore reserves at approximately existing levels through replacement, by exploration and development, of the ore being mined. Much of this incentive will have to come from confidence in the future market for atomic power. I hope that the information presented will contribute to that confidence."



Vanadium Corporation of America is said to be carrying out the biggest exploration and development program in its history in the Naturita area of Colorado. Extensive exploration work is being carried out by geologists and drilling crews and actual development of certain new properties is said to be already under way. Two new operations have been started which are yielding good tonnages.

Trail Mines Inc. of Colorado Springs, Colorado has made its first shipment of thorium ore from its property near Cripple Creek. Eventual destination of the ore is to a large eastern chemical company. The firm plans to eventually produce about 500 tons of thorium ore per month.

Beaver Mesa Uranium Inc. of Grand Junction, Colorado has decided to increase its current production rate of uranium ore. Since the assured market price for uranium are as established by the AEC will expire on March 31, 1962, the firm has decided to double the current 6,000-ton-per-month rate to extract most of the known ore reserve before that date. New mining equipment and machinery totaling $80,000 has been purchased to increase the production level as soon as possible. The company recently acquired long-term mining leases on 1,585 acres adjoining other company properties on Beaver Mesa in the Gateway mining district. The property had first been drilled under a $560,000 DMEA loan. During the year ended August 31, 1957, the company mined and sold 55,154 tons of ore assaying an average of 0.28 percent U_3O_8 and 0.98 percent V_2O_5.

Waggoner and Walling report a strike on their property in Ruby Basin near Silverton, Colorado. Ore in a current drifting operation has been averaging 63 ounces silver, 20 percent lead, and a quarter ounce gold. This drift is off a 220-foot crosscut driven this past season. The owners have been working the property off and on for the past six years.

Kerr-McGee Oil Industries Inc. is planning an exploration of the *Colohoma* and *Alpha* claims in San Juan County, Utah. The property was farmed out to Kerr-McGee by *Lisbon Valley Uranium Company* of Denver. The two groups of claims are reportedly spread along 1½ miles of the Lisbon Valley Fault. About 20,000 feet of drilling were completed previously which drilled out an ore body about 865 feet below the surface.

Radorock Resources Inc. of Salt Lake City, Utah has applied to the Atomic Energy Commission for a license to sell yellow cake to the government. According to "P.I.'s Uranium Information," the product will be manufactured at *Uranium Reduction Company's* uranium ore processing mill at Moab. Ownership will be retained by Radorock with Uranium Reduction acting as agent in the sale. *Hecla Mining Company* has a similar AEC license.

New Park Mining Company has engaged *E. A. Messer & Associates* of Portland, Oregon to do 1,000 feet of diamond core drilling on the Lakes of Killarney Fault in the Ophir district of Tooele County, Utah. The property was

ROCKY MOUNTAIN

leased from *Silver Standard Mining Company* and *National Treasure Mining Company*. New Park is seeking base metals. Operations at New Park's *Mayflower* mine in Park City are still at a standstill. The firm was forced to close down this operation in late September because of low prices for lead and zinc. A group of former employees, headed by Leo Hatch of Heber City and William Larsen of Midway, then leased the property. Operations were blocked by picket lines of the United Steelworkers of America who objected to the hand-picking of the 67 employees participating in the new agreement; the union insists the men be hired on a seniority basis.

WYOMING

Western Nuclear Corporation is reported to have purchased an 18-claim uranium prospect in the Shirley Mountains of Carbon County, Wyoming from *Nugget Coal & Timber Company* of Denver.

Vitro Minerals Corporation is opening a large new uranium open-pit mine in the East Gas Hills on the *Pix* group of claims which the company acquired from *Veca Minerals Company* in July. The new pit is actually an extension of the *Myrna Lynn* mine opened by Veca Minerals on adjoining property. Stripping operations are being conducted by *Rissler and McMurray Construction Company* of Casper, Wyoming, and are expected to be completed this month. A total of 354,000 cubic yards of overburden will be removed to expose the ore, lying at a depth of from 44 to 70 feet.

Wyoming Uranium Corporation has filed suit against *Phelps Dodge Corporation* seeking to require P-D to arrange participation by Wyoming Uranium stockholders in profits from the milling of Wyoming's ores. P-D exercised an option earlier this year to acquire a 51 percent interest in Wyoming Uranium property in Fremont County. Under the agreement a subsidiary firm, *Green Mountain Uranium Corporation*, was formed in which P-D owns 51 percent of the stock and Wyoming Uranium 49 percent. According to the latter, however, Wyoming Uranium's holdings have not yet been transferred to the new corporation.

First Blast Furnace Now Operating in Spain

Inauguration of Spain's first blast furnace, at the Empresa Nacional Siderugia S. A. Steelworks at Aviles, marks the first step in the government-owned Instituto Nacional de Industrias' plan to make Spain self sufficient in iron and steel products.

With approximately 4,000,000 tons of iron ore produced annually by Spanish mines, coal supplied by mines in the nearby province of Asturias and from the United States, and installation of three additional blast furnaces planned, future production of 2,500,000 tons of steel annually is anticipated.

The second blast furnace, now under construction, will increase production to 1,140,000 tons of pig iron and 1,390,000 tons of steel ingots annually. Two more blast furnaces are scheduled to go into production between 1958 and 1960.

Crude ore is now being crushed to a maximum size of 63 millimeters and all sizes above 10 millimeter go directly to the mixing plant, which has a capacity of 1,000 tons an hour. Sizes below 10 millimeter go to the sintering plant which has a production capacity of 45 to 75 tons an hour.

Included in the overall expansion program of the steel works is the construction of an additional thermal electric power plant, and dams have been constructed in the Corvera and Gozon Rivers to supply hydroelectric power. The port of Aviles, where the plant is located, has been widened and modernized and additional port installations will be built in the future.

Alaska Miners Survive Short Season, Low Prices

A late spring, dry season, and early freeze up, together with current low gold prices, added up to a poor season for Alaskan gold miners. Most operators suffered heavy losses and few new developments were reported.

In the area around Flat, Alaska (400 miles southeast of Fairbanks), mining operations were carried on by the Fullerton Brothers on Flat Creek; Alex Matheison on lower Flat Creek; John Ogriz and Arnold Kobler operating the Riley Investment dredge on Otter Creek; and the Miscovich Brothers on Discovery Otter. Operations at Colorado Creek, by John and Richard Fullerton, were closed down and activities transferred to Flat. Alex Matheison, who has operated a dredge in the area for many years, is reportedly giving up mining and has placed his dredge and equipment on the market.

At the Golden Horn Mine, near Discovery Otter, a new development was undertaken by John Murphy, Bob Lyman, Nick Mellick, and associates. The gold quartz mine is being revived and reports indicate a mill may be operating there next season.

Dredging on the Gaines Creek was begun by the Magnuson Brothers but no report of their operations has been released. The dredge was formerly operated by Rosander, Beaton, and Molitor.

The Bear Creek property formerly operated by Eric Hard and Gus Uotila was taken over by Tex Gates and family. Gus Uotila is now operating on Ophir Creek, near the town of Ophir. At the head of Colorado Creek, Strandberg and Sons operated a dragline and washing plant, and a dragline and dozer combination was operated by George and John Micovich on the Poorman Creek property formerly mined by Kick Bush and Joe Davis.

Other operations included Clarence Zaiser's dragline at Greenstone Creek; Bob Deacon's crew on Long Creek; and Pat Savage operated a dragline and dozer on the upper end of Long Creek.

Water shortage was the major difficulty in all gold mining operations this season, but there are still hopes that next year will be better.

St. Patrick Development Progresses on Schedule

The first shipment of ore has been made from the St. Patrick Mining Company, Ltd.'s property under development in Avoca, County Wicklow, Ireland. The shipment consisted of 350 tons of sample copper ore sent to Amsterdam, The Netherlands, for smelting and processing.

Recent reports indicate regular production is scheduled to begin in the spring of 1958. Sub-level development has advanced on five levels, the 772, 875, 935, 995, 1,055, and the lower haulage level at 1,121 feet. The main haulage tunnel, a 16- by 16-foot inclined ramp, has been driven to the slope length of nearly 3,000 feet and provides nearly five years' ore supply above this depth. Sampling of the development work, particularly in the Upper South Lode, has shown the ore to be of a higher grade than formerly indicated by drilling averages.

The mining method will combine long drilling transverse to the strike with open stope mining using trackless equipment. Short-boom shovels will be used for production loading underground.

Construction of the concentrator is proceeding on schedule. Most of the concreting has been completed and steel erection is now underway. All equipment is scheduled to reach the property by the end of 1957.

According to earlier reports (see MINING WORLD, December 1956, page 64) efforts will be made to establish a smelter in Eire if current development work results in large producing mines. At the present time ore must be shipped through the nearby port of Arklow, for smelting on the continent.

New Railroad Gives Access To Manganese Deposits

A new source of manganese ore will be opened to United States mills with the construction of a 38-mile railway in British Guiana. The road, built for North West Guiana Mining Company, Ltd. of Toronto, Canada under the direction of African Manganese Company, Ltd. of London, England, will run from the company's mines near the Barima River to the British Guiana Coast. There the ore will be transferred to water carriers for shipment.

The mining company expects to ship from 300,000 to 500,000 tons of manganese ore annually. Most of the ore will be shipped to the United States, where it will be received and processed through the new ore dock now under construction at Newport News, Virginia, and then distributed to United States buyers.

The construction contract for the two-year, multi-million dollar project was awarded to J. H. Pomeroy & Company, Inc. of San Francisco, California.

TANGANYIKA—Producton of columbite is to be increased by *Mbeya Exploration Company* at its property in Panda Hill by the installation of a new plant. Mining circles believe that this will enable Tanganyika to become the biggest producer of columbite throughout Africa.

FEDERATION OF RHODESIA & NYASALAND—*M.T.D. (Mangula) Ltd.*, an associate of *Messina (Transvaal) Development Company*, and previously known as *Rhodesia Copper Ventures Ltd.*, is expanding its operations at Mangula in the Sinoia area of Southern Rhodesia. The initial output goal has been about 15,000 tons of copper concentrates annually which, it is intended, will be raised to about double that figure. The milling plant incorporated a unit comprising a 22-foot Aerofall mill and an 8-foot by 15-foot regrind ball mill. The extension will consist of another such unit, it is understood, and additions to the flotation section.

UNION OF SOUTH AFRICA—*Buffelsfontein Gold Mining Company Ltd.*, which in the third quarter milled 334,000 tons or about 111,300 tons a month, is extending the capacity of the gold plant still further. The hoisting capacity of the existing twin-shaft system is stated to be 170,000 tons a month, and according to the last report about 10 percent waste was being sorted. In the third quarter, the first of uranium production, the declared uranium profit amounted to about 38.6 percent of the total working profit.

FEDERATION OF RHODESIA & NYASALAND—*Roan Antelope Copper Mines* at Luanshya in Northern Rhodesia had its Irwin shaft out of operation for about a month while fitting larger motors to the hoist. This will enable ore hoisting to be effectively carried out at 2,700 foot depth instead of the present 2,000. During that period, while the Irwin was out of operation, about 18,000 tons of ore per day were hoisted through Storke shaft which is the other hoisting shaft. A 1,000-ton crude ore storage and loading bin has also been completed at the Irwin.

GHANA—*Ashanti Goldfields Corporation Ltd.* reports the best financial year in its history as the one just ended September 30, 1957. Milling and gold recovery were higher than at any other time. The mill handled 338,737 tons of ore which gave a recovery of 275,332 ounces of gold equal to 16.3 dwt. per ton. These record figures may be attributed to the recent policy of reconstruction and modernization which, among other things, provided a new shaft system, a better standard of plant and equipment, and adequate mine development for the future.

UNION OF SOUTH AFRICA—*Free State Saaiplaas Gold Mining Company*

INTERNATIONAL

Ltd. increased the shaft sinking record for all types of shafts to 834 feet during September in its No. 2 shaft from the previous record footage of 763 feet. At the end of the month, the depth reached was 1,033 feet, the formations traversed being the Karroo and Ventersdorp Lavas. In the same period 810 feet were lined. The shaft is circular, with a diameter inside lining of 27½ feet. In the quarter ended September 30, the No. 1 shaft, circular with a 24-foot diameter inside lining, was sunk 944 feet to 3,821 with operations retarded by water-bearing fissures requiring cementation.

FEDERATION OF RHODESIA & NYASALAND—Sinking of Mindola shaft No. 2 at the *Nkana* mine in Northern Rhodesia, which started in July of last year, is making excellent progress. It is estimated that the shaft will be in production by October 1958. It is circular, 24 feet in diameter, and will be 3,200 feet deep. There will be an 80-foot concrete collar, three feet thick, and the remainder of the shaft will have a one-foot concrete lining. The shaft will have the Copperbelt's first tower-mounted Koepe hoist which will have a capacity of 500,000 tons of ore hoisted per month with the hoist operating 20 hours per day over a 26-day month.

UNION OF SOUTH AFRICA—*Umgababa Minerals Ltd.*, an associate of the *Anglo American Corporation of South Africa Ltd.*, plans to start production about the middle of next year. The firm will mine along a five-mile stretch of the Natal south coast between the Umzimbazi and Ingane Rivers, for the production of rutile, ilmenite, and zircon. Ilmenite will be produced at a rate of 100,000 tons a year, while zircon and rutile will be recovered at a rate of 10,000 tons and 7,000 tons, respectively. A £1,500,000 plant is being installed on a site between the national highway and the sea. A dam is being built on the Umgababa River to supply water to the mine. Ilmenite will be shipped to Durban where the company will erect a bulk storage and handling plant. The rutile and zircon will be shipped in bags.

FEDERATION OF RHODESIA & NYASALAND—A nickel deposit in norite has been reported on property held by the Trojan nickel mine in the Bindura area of Southern Rhodesia. The mineralization is said to be three miles long, and varying in width from 150 to 650 feet.

GHANA—*Ariston Gold Mines (1929) Ltd.* reports that high values have been exposed in a crosscut on the 25th level which seems to indicate that, like the No. 2 ore body, the North section will also yield appreciable reserves from depths below the 24 level. High values were encountered on the 26 level of the No. 2 ore body from the hanging wall reef, this ore body having split into two sections. This may mean that there will be two payable reefs and driving south is continuing in order to prove or disprove this theory. The firm has been concentrating on deep exploration of the North ore body since lateral development had already exposed the full extent of all presently known lodes above the 24 level.

UNION OF SOUTH AFRICA—*Rhodesia Railways Ltd.* has offered for sale its exclusive rights to prospect and mine all minerals in the Vryburg and Kuruman districts of the Northern Cape in an area of about 6,600 square miles. The suc-

cessful bidder will be required to spend about £100,000 a year for five years in prospecting, with reductions to be provided for where deemed necessary. The concession is renewable, but excludes certain asbestos deposits, the mining rights of which have been granted to *Cape Blue Asbestos Mines (Pty.) Ltd.* Apart from these deposits, manganese, Cape blue asbestos, and limestone are known to exist; indicated occurrences include iron ore, diamonds, chrysotile asbestos, gold, lead, and zinc.

FEDERATION OF RHODESIA & NYASALAND—The prospecting company of the *Rhodesian Selection Trust* group has acquired exclusive copper prospecting rights over about 282 square miles in Southern Rhodesia.

SIERRA LEONE—A molybdenite deposit is reported to have been found in the area of the Wankatayna River on the west side of the Sula Mountain in Sierra Leone. Investigations are being made to determine whether the ore occurs in sufficient quantity to justify commercial development.

UNION OF SOUTH AFRICA—The latest plant expansion by *Rustenburg Platinum Mines Ltd.* has brought the capacity of the mine up to 2,600,000 tons per year, but the throughput will remain on the current 2,200,000-ton level until the demand for platinum warrants additional production.

FEDERATION OF RHODESIA & NYASALAND—*Anglo-Transvaal Consolidated Investment Company Ltd.* is reported to be drilling for base metals near Sasare, at the edge of the Luangwa Valley, about 200 miles east of Broken Hill in Northern Rhodesia.

UNION OF SOUTH AFRICA—*Stoltzburg Asbestos (Chrysotile) Holdings Ltd.* has become associated with *Mountbridge Exploration and Investment Company (Pty.) Ltd.*, representatives of large French asbestos consumers. This has enlarged the outlet for marketing fiber grades more in line with run-of-mine, and has improved the financial situation of the firm. Geophysical and drilling exploratory operations are now proceeding, and if results are good a major development program may be undertaken.

FEDERATION OF RHODESIA AND NYASALAND—Thorium from Nyasaland is being investigated. Discovery was made by analyzing sands from Monkey Bay which were found to contain radioactive material.

VICTORIA—*Reynolds Metals Company* has formed an Australian subsidiary, *Reynolds Pacific Mines Ltd.*, with headquarters in Melbourne. Preparations are under way to send geological teams into various parts of northern Australia to search for bauxite and other raw materials. A permit has been granted to explore 10,000 square miles. Equipment is being shipped from the United States for the exploration work. Walter L. Rice is president of the Australian firm.

REPUBLIC OF THE PHILIPPINES—*Philex Mining Corporation* has signed a contract with *Nippon Mining Company* of Japan for the sale of the firm's entire production of copper concentrates from the *Santo Tomas* project in Mountain Province. The first shipment is expected to be made next May. Construction of the 1,800-ton mill is proceeding ahead of schedule and is expected to be in operation by then. At the *Thanksgiving* mine being operated by Philex for *Benguet Exploration Company*, mill heads are averaging around 0.86 ounces gold per ton.

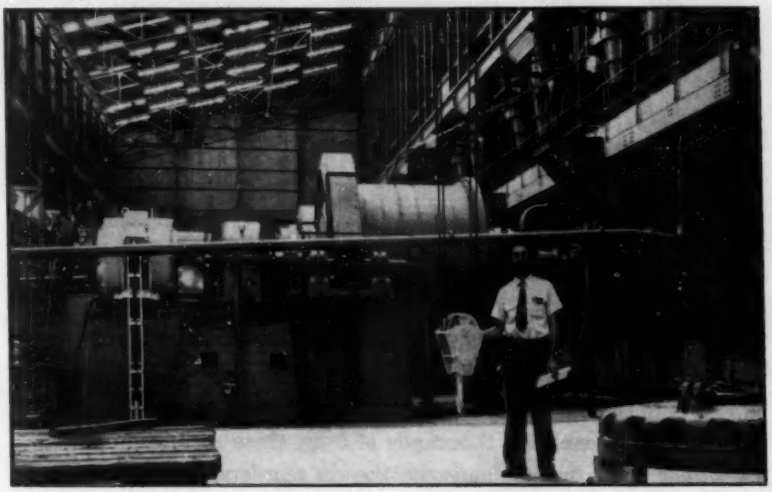
NEW ZEALAND—Plans have been announced for establishing a £25,000,000 iron and steel industry based on iron sands of the western Taranaki area. A private company, *New Zealand Development Ltd.*, with £Stg. 5,000 capital will pioneer the venture. The company hopes to attract the requisite capital and to build a plant at Port Chalmers, Dunedin, to which ore would be shipped 600 miles. Coal and power are available in the South Island and further large-scale power developments are planned. Earlier attempts to smelt New Zealand iron sands failed because of the titanium content and resultant metallurgical difficulties. New types of electric furnaces are believed to provide a solution to such difficulties.

TASMANIA—The *Electrolytic Zinc Company of Australasia Ltd.* and *Mount Lyell Mining and Railway Company* are to examine an area of 1,521 square miles from Denison Range to New Harber, embracing Adamsfield and Lake Pedder. The relationship of this area to the geological structure of the mineral-bearing areas of the west coast will be assessed. The Electrolytic Zinc Company has a prospecting license over an area of 740 square miles on Tasmania's east coast covering all unoccupied Crown land near Avoca, Storey's Creek, Rossarden, Mathinna, Mangana, Royal George, and Scamander. Tin and tungsten are already produced in the area, and interest has recently been shown in uranium occurrences near Rossarden. Mount Lyell has made reference to a new ore discovery in the vicinity of present leases. A number of test holes have been drilled with comparatively rich intersections in some of them but proving of the deposit will take two to three years. Reasonable discoveries of even moderately high-grade ore could have dramatic consequences for Mount Lyell which has stated publicly that the forthcoming tariff determination will indicate whether present low-grade deposits can continue to be worked at a profit.

REPUBLIC OF THE PHILIPPINES—Four foreign firms have received contracts for the supply and installation of machinery and equipment for a pig iron smelting plant on Mindanao Island. The pig smelting plant is to supplement the steel re-rolling plant now in operation in Iligan City. The firms receiving the contracts are *Demag Elektrometallurgie* of Germany, *Syndicate Belge d'Entreprises a l'Etranger* of Belgium, *Elektrokemisk* of Norway, and *Loewy-Hydropress Division* of *Baldwin-Lima-Hamilton, Inc.* of New York.

NEW GUINEA—*Bulolo Ltd.* treated 8,246,000 cubic yards during the year ended May 31, to recover 51,826 ounces of gold.

FIJI ISLANDS—In the 12 months ended June 19, *Emperor Gold Mining Company Ltd.* at Vatkuola produced 61,403 ounces of gold from 154,784 tons of ore.



Bancroft Uses Hydrocyclones in Grinding Circuit

Bancroft Mines, Ltd. of Northern Rhodesia, the African Copperbelt's youngest copper producer, is still experiencing mining and treatment difficulties and production is behind schedule. Despite the difficulty caused by excessive water and mud in the mine, production has increased to about 60 percent of the present concentrating capacity. Annual production is believed to be around 20,000 tons of copper. The expansion plan set up in 1955, to double copper production by 1960, has been slowed down because the drop in copper prices has caused a corresponding drop in Bancroft's revenue. However, rumors that the mine is to be closed because of present low copper prices has been officially denied. Pictured above is the number one grinding section of the Bancroft concentrator. This is the first concentrator installed in the Copperbelt to use hydrocyclones only, for classification. Rated mill capacity is 150,000 tons per month with future plans to double this. Note how cyclone overflow joins ore feed to ball mill which has no scoop or scoop box. Matt Fitzgerald, concentrator superintendent, is shown in the foreground.

TASMANIA—The *Australian Aluminium Production Commission* has requested the Federal Government to limit Australia's imports of alumiaum. In 1956-1957, the Commission was forced to sell 700 tons overseas at a loss. It suggests that imports should be limited to the difference between domestic production and demand.

REPUBLIC OF THE PHILIPPINES—*Consolidated Mines Inc.* and *Benguet Consolidated Inc.*, which manages properties for Consolidated, have signed a contract with *Nanyo Bussan Company Ltd.* of Japan for the sale of 550,000 tons of chrome fines from the *Coto* properties (Masinloc). The company is also conducting an extensive research program in an effort to expand the uses of fines which until recently had been unsaleable by the firm.

WESTERN AUSTRALIA—*South Alligator Uranium N.L.* reports favorable developments in its *Rockhole* prospect where 100 tons of minimum pitchblende content have been proved. The deposit has now been proved over a length of 563 feet, with a mineable value of 1.0 percent U_3O_8 over three feet. It is expected that pitchblende will continue on this course to tie up with surface showings in the O'Dwyer's and Sterrit's areas. Mining operations have been halted in favor of continuing prospecting to prove as much ore as possible before the end of 1957 as, until that time, the South Alligator companies may enter into a contract with the United Kingdom Atomic Energy Authority for the sale of uranium ore at a satisfactory price.

INDONESIA—Newly discovered iron ore deposits are reported from the regency Pandeglang, ketjamatan Saketi, desa Langensari (West Java). Fifty kilograms of the ore were sampled and sent to the laboratory of the Geological Department to be analyzed.

SOUTH AUSTRALIA—The Tariff Board, following public inquiry, has recommended that bounty be paid for sulphur recovered from the sintering of lead concentrates and used in the manufacture of sulphuric acid. Previously, "sulphur" bounty was paid only for sulphur content of local pyrite used in acid manufacture. The new recommendation follows a request by *The Broken Hill Associated Smelters Pty. Ltd.* which for nearly a year has produced acid in a new plant from sulphur dioxide recovered from the company's new updraught sintering plant.

REPUBLIC OF THE PHILIPPINES—*Pacifica Inc.* has been formed to explore for oil and to mine metallic ores. Among the incorporators are Olivera Laperal, Emma L. de Laperal, Go Pailian, and Rodolfo M. Lejano.

FIJI ISLANDS—Routine reports recently published by *Emperor Mines Ltd.* of Vatkuola, indicate progress in the long-term development plan with further proving of ore between 8 and 10 dwts. per ton (about the average grade of present reserves).

QUEENSLAND—The dredge of *Ravenshoe Tin Dredging Ltd.* has started exploration near Mount Garnet; this makes two in the area, the other being that of *Tableland Tin N.L.* which is now producing 40 to 50 tons of concentrates monthly. Power from the Tully Falls hydroelectric project became available in July and will result in operating economies. First production figures from Ravenshoe (which is over a year behind schedule) are awaited with interest.

SARAWAK—Management of the *Sematan Bauxite Ltd.* operations in the Sematan area of the Lundu district is in the hands of the *Ott Group*. Ownership of the new firm (details in MINING WORLD, September 1957, page 121) is shared by Ott and *Aluminum Ltd.*, with certain Japanese aluminum manufacturers expected to participate also. Mining equipment to be used in the new washing plant will be purchased largely in Japan.

VICTORIA—*Gold Mines of Australia Ltd.* (now absorbed by *Western Mining Corporation Ltd.*) at its annual meeting reported on prospecting at Stawell, where it had been hoped to establish a mining operation on residual ore in old mines and continue exploration by underground development. Holes were drilled to 970 feet and 1,200 feet, and wide quartz reefs with low values were intersected. Prospecting for an extension of the field will be undertaken by surface drilling as and when circumstances permit.

REPUBLIC OF THE PHILIPPINES—*Samar Mining Company* has decided to shut down its mining operations at its *Camcueves* property, and to increase exploration and development operations at its other properties at Masara in Davao and Sibuguey in Zamboanga del Sur through the release of the Camcueves equipment. The decision to close down

the first property came because of number of reasons—dwindling ore reserves, new regulations of the Central Bank which reportedly made it virtually impossible for the company to take advantage of the barter law, and an order forbidding the company to dump its tailing in the Balo River.

NORTHERN TERRITORY—A third shipment of 50 tons of pitchblende concentrate has been made to the United States by *United Uranium N.L.* from its *El Sharana* mine. Ore from the company's *Palette* mine is being concentrated for recovery of both pitchblende and gold (the latter by amalgamation). Driving and diamond drilling of the company's ore bodies is being undertaken to explore for ore extensions and repetitions, especially at Saddle Ridge where there appear prospects of repetition of the main ore body.

NEW ZEALAND—*Kaniere Gold Dredging Ltd.* at Taramakau continues to show a monthly return of over 1,000 ounces of bullion. This is about 950 parts fine gold per month from 400,000 cubic yards treated in 560 hours.

AUSTRALIA—The *Australian Association of Mineral Sands Producers* has been formed by producers from New South Wales and Queensland to deal with matters and problems affecting the industry as a whole. D. G. Cummins, *Associated Minerals Consolidated Ltd.*, has been elected president.

NORTHERN TERRITORY—*Territory Enterprises Pty. Ltd.* which is operating the Rum Jungle uranium deposit, is reportedly interested in recovering cobalt as well as copper from the uranium concentrates. It is stated also that a nearby lead deposit contains 20,000,000 tons of lead ore which also has a cobalt content.

LATIN AMERICA

BRAZIL—According to local reports, *Kaiser Aluminum & Chemical Corporation* will build an aluminum plant in Maceio, state of Alagoas, instead of Recife in the state of Pernambuco. The new plant is to be ready for operation in 1960, with output planned for 90,000 tons.

BOLIVIA—The Bolivian Power Agency has notified the *Corporacion Minera de Bolivia* which manages all of the mines in the country that power for the mines will be cut 50 percent. The lack of rain has necessitated the reduction and it is hoped that heavy rains will come soon in order to alleviate this situation.

MEXICO—*Zinc Electrolitico S.A.* has been formed by *Cia. Impulsora Minera de Angangueo*, a government-aided mining cooperative which is currently operating the former unit of the *American Smelting and Refining Company* at Angangueo, Michoacan. The new firm will build and operate an electrolytic pilot plant for treatment of lead and zinc from the local mines. A hydroelectric power plant will also be erected. The firm is capitalized for 3,000,000 Pesos ($240,000), of which 40 percent will be held by the National Mining Stimulation Commission, 40 percent by Impulsora, and the remainder by private interests in the region.

View of ore bank before final cleaning of face prior to shot.

Loading "Nitramex" 2H in bore hole. 9" x 18" unit weighs 73.5 lbs.

Pouring Pelletol No. 1 into hole to fill annular space around column. The combination of "Nitramex" 2H and Pelletol No. 1 gives the highest possible concentration of energy at the bottom of the hole where it is needed to break this very hard ore.

Du Pont "Nitramex" 2H in action. Using this very high density blasting agent helped Jones and Laughlin overcome a tough shooting problem with maximum safety.

Ore bank after the shot. Note the excellent breakage produced by "Nitramex" 2H.

High density of Du Pont "Nitramex"® 2H solves tough shooting problem

Blasting magnetite is always a problem, but at the Jones and Laughlin Steel Corporation open pit at Star Lake, New York, they found that Du Pont "Nitramex" 2H does a better job of breaking bottom than any material they have used.

"Nitramex" 2H has a density of 1.80—provides a far higher concentration of energy per foot of bore hole than any other blasting agent or commercial explosive.

Because "Nitramex" 2H has infinite water resistance, it can be loaded in wet holes as long as necessary before shooting.

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CHILE—A new company has been organized to develop an iron ore deposit recently located by technicians of the *Chilean Production Development Corporation*. The deposit is in the coastal range of Nahuelbuta, about 200 kilometers south of Concepcion, and is estimated to contain over 100,000,000 tons of ore. The new firm has been organized by *Corporacion de Fomento, Mining Credit Bank*, and private capital. The *Krupp* firm of Germany is to determine the quality of the ore and ore samples have already been sent to Germany for analysis. Large-scale development is considered important because it will provide iron ore for the *Huachipato Steel and Iron Works* near Concepcion.

VENEZUELA—Shipments of Venezuelan iron ore are now being made to the *U.S. Steel Corporation's* Youngstown, Ohio plant. The first shipment of 65 cars was a forerunner of 150,000 tons, destined for Ohio.

CUBA—Evaristo Colino and Dr. Wilfredo H. Brito, Jr. reportedly have obtained a concession covering 15,000 hectares near Puerto Esperanza and Cayetano in the province of Pinar del Rio. Mr. Brito is president of the *Inter-American Uranium Corporation* which has drilled one test hole to 115 feet and has also sunk numerous six-foot shafts to test a bed believed to contain uranium minerals. The radioactivity has been noticed in a number of localities in Pinar del Rio. This is the second area in Cuba, where an interest in uranium has been shown. *Cuban Stanolind Oil Company* and *Cia. Petrolera Trans-Cuba* previously obtained a 15,000 hectares concession around central Camaguey.

MEXICO—Increased trucking facilities will soon be available for the Mazapil and Concepcion del Oro mining zones in Zacatecas with the start of construction of a 20-mile road by the National Local Roads Building Commission which is financed by the federal, state, and municipal governments, along with contributions from companies which will benefit from its work. These particular mining zones are important gold, silver, lead, zinc, copper, and iron producers.

CHILE—Chilean mining engineers are reported to have discovered copper deposits 80 miles north of Santiago de Chile on the site of an abandoned operation in Aconcagua Province. Good rail connections with Papudo where the government is planning to build a copper smelter are said to exist. The new discovery is reported to be 11 meters thick and expected to contain between 2,000,000 and 10,000,000 tons of ore assaying 3 percent copper. The old mine which is still being worked has produced 100,000 tons of 2.5 percent ore. The firm has a treating plant at nearby Cerro Negro. Also in Aconcagua Province, the U.S. firm of *Keller & Company* is said to be investing $500,000 in *Cia, Minero Sociedad Huanillos y Batuco* which operates the copper mines in *Mantos de Luna*. Present output is 400,000 tons which will be increased to 1,500,000 tons. A 36,000-ton-per-year leaching plant is to be installed.

BRAZIL—Italian capitalists, represented by Prof. Angelo Tarchi, an Italian ex-minister, have made a proposal to build a new 500,000-ton steel plant in the Paraopeba Valley, state of Minas Gerais. They would invest 10,000,000,000 cruzeiros and would subscribe 60 percent of the capital. The proposal was made to the Banco Nacional do Desenvolvimento Economico. According to the offer, a 3,000-kilometer road would be paved in three years.

BOLIVIA—The financial status of many of the mines oeprated by the *Corporacion Minera de Bolivia* for the Bolivian government has been steadily declining. Several mines have suffered heavy losses. Because of political patronage, the number of workers is much larger than required. Under pressure of the continuing drop in metal prices, authorization has at last been obtained to close several mines, and to reduce considerably the number of workers at many others. A large number of these miners will be returned to the agrarian sections from which they came. A special commission of *Messrs. Ford, Bacon & Davis* is studying the possibilities of re-equipping the *Catavi, Colquiri*, and *Huanuni* tin mines and improving the financial status of the three units.

FRENCH GUIANA—The Bureau of Mines is reported to have announced that mining of the bauxite deposits in the Kaw Mountains would be undertaken shortly. The deposits are estimated to contain 70,000,000 tons.

ARGENTINA—According to a recent study, the sulphur reserves of Cerro Tuzgle in Jujuy are estimated at 1,000,000 tons of caliche containing a maximum of 26 percent sulphur. This deposit is found at a height of 5,300 meters above sea level. Another important sulphur bed is that of Cerro Overo in Mendoza, considered until recently one of the most important in the country. It is believed that reactivation of these sulphur deposits would permit the country to be self sufficient in this mineral.

CENTRAL AMERICA—A report on the mineral deposits of Central America containing maps, charts, geologic notes and accounts of mining activities has been published by the Geological Survey under auspices of the U. S. State Department's *International Cooperation Administration*. The report summarizes the geographic features and geology of the seven countries comprising Central America to provide a setting for the description of the ore deposits, which include antimony, chromite, copper, gold and silver, iron, lead-zinc, manganese, mica, quartz, quicksilver, and tungsten. It also contains a colored geologic map of the area compiled both from existing sources and new mapping, as well as numerous detailed maps and sketches of individual mine areas. Unfortunately most of the ore deposits so far discovered are relatively small, and although some of them are high grade, production has been very modest. Difficult terrain and poor transportation facilities have also hindered development of a more active mining industry, particularly for bulk commodities that command a low price. Copies of USGS Bulletin 1034, "The Mineral Deposits of Central America" by Ralph J. Roberts and Earl M. Irving, are available at $8 per copy from the Superintendent of Documents, United States Government Printing Office, Washington 25, D. C.

BRAZIL—The Institute of Nuclear Energy has successfully started up its new research reactor, marking the first time sustained nuclear fission has ever been achieved in Latin America, according to *The Babcock & Wilcox Company*, builder of the reactor.

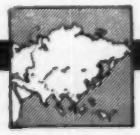
ARGENTINA—Interest in beryl mining is gradually being abandoned because of

the low price paid by the LAPI, the state organization which monopolizes its sale.

MEXICO—What a high government official has described as a "singular case" in the history of Mexican mining is the success of workers and engineers in operating the *Santa Rosalia* mine in the Territory of Lower California. This mine was abandoned as unprofitable by the *Boleo Mining Company* two years ago after 80 years of operation. The 5,000 inhabitants of the 150-year old settlement then organized a cooperative with the aid of the Mining Development Bureau. Despite a series of falls in the price of copper, the group has been able to achieve what Boleo could not do—a 1,025,000-peso profit.

BRAZIL—Dr. Socrates Bomfim is now sole owner and operator of the *Beneficiente* manganese mine, 350 miles south of Manaus. Production presently averages about 140 tons per day, with a minimum daily quota of 100 tons. The ore averages 46 percent Mn with a low iron content. There are actually three separate mining sites: Beneficiente, which covers 1,600 hectares on the western side of the Aripuana River; another on the opposite side of the river, covering another 1,600 hectares; and seven kilometers inland is the *Cotovelo*, where operations will start when the road has been completed.

SURINAM—*N.V. Billiton Maatschappij* has placed a $1,000,000 order with *Hewitt-Robins Inc.* for the design and manufacture of a conveyor system to handle clay, sand, and peat overburden covering a rich bauxite deposit. The conveyor system will receive the overburden from a bucket wheel excavator and deliver it to a dump about two miles away. Depth of the overburden is said to be from 15 to 35 feet deep. The mining area is swampy and must be drained prior to excavation. The ore will be shipped by rail to the banks of the Surinam River where it will be dried, and then loaded aboard ships for transportation to the United States and Canada.



BURMA—Negotiations for the participation of the Union government in a joint venture with *Mawchi Mines Ltd.* have now been completed. The government will pay off the loan of £450,000 raised by the company in London, and due to be repaid by March 31, 1958, and will also advance a loan of ks 2,000,000 (£150,000) through its *Mineral Resources Development Corporation*. Before the war, Mawchi mines produced about 6,000 tons of tungsten and tin concentrates annually. Present output is about one-tenth of this. The main difficulty has been lack of skilled personnel which will be partly solved when 30 technicians hired in England will arrive at the mine. The company has spent more than £1,000,000 on rehabilitation of the mine since 1953. It is expected that the agreement will be signed in April 1958. At present, representatives of the company and the Union Ministry of Mines are discussing the possibility of expanding the operations in which case both parties will contribute equal shares to the additional investment.

INDIA—Development of a shipping port at Paradwip in Orissa state is being examined by the Japanese to promote export of iron ore from some mines in Orissa. The project is like the one established at Reddy in Bombay state on the Arabian Sea coast.

MALAYA—*Kramat Tin Dredging Ltd.'s* dredge is now approaching the Eastern Section of the property where operating conditions are more favorable and this will be reflected in production results ahead. Output of tin concentrates in the year ended August 27, 1957 totaled 459.11 tons, an encouraging increase of 93.51 tons.

JAPAN—Several new uranium discoveries have been made in Tottori, Okayama, and Fukuoka prefectures. The Tottori Prefectural Underground Resources Development Bureau says its discovery is a rich uranium vein of an entirely new type. It was found in a strip of clay in the hills of Misaki-machi. Maximum width of the vein was about 13 feet 2½ inches, and it runs north to south across already known uranium deposits of the *Kurayoshi* mine. In Okayama prefecture, the most promising areas of the Hirusen Highlands will be given a more detailed checkup by the Ministry of International Trade and Industry in cooperation with the Geological Research Institute and the *Atomic Energy Fuel Corporation*. In Fukuoka prefecture, deposits in the Shimomazaki area in Kawasaki have been confirmed to contain a maximum of 0.8 percent uranium, the highest found so far in the country. These deposits are estimated at 117,000 tons.

SOUTH KOREA—A total of $2,393,200 and HW1,965,400,000 will be invested for the development of the *Yangyang* iron mine during 1956-1960 to boost the production of iron to 360,000 tons annually. The *Samhwa* iron mine also is to be developed under a five-year program beginning in 1958 with $915,568 and HW867,195,000 to boost iron ore production to 120,000 tons annually.

TAIWAN — The *Taiwan Aluminum Corporation*, which represents the aluminum industry of Nationalist China, is reported to be working on a broad-scale modernization project which is designed to increase ingot production capacity and to increase mill and fabrication facilities to match an increase in metal production. Under expansion plans, the present reduction facilities will be modernized and 32 new potlines are scheduled to be added for the initial expansion stage. The ultimate capacity is to be 20,000 tons annually. Rolling capacity will be doubled to about 1,000 tons monthly; foil mill potential expanded to about 2,000 tons a year; and extruding capacity doubled.

INDIA—Steps have been taken to survey magnesite deposits in the Garhwal and Almora districts in the Himalaya region of the United Provinces. At present magnesite is mined only in Madras and Mysore in southern India. Because of the establishment of new steel factories, the demands for magnesite will be increasing, however, and so the deposits in northern India are being surveyed.

PAKISTAN—The search for uranium-bearing minerals in Pakistan is being stepped up. A number of radioactive specimens have been found in West Pakistan and these are under more intensive study. More modern equipment has been ordered from the United States to cope with the accelerated program, and four geological experts are reportedly also on their way from the U.S. to Pakistan to lend assistance in this program.

BURMA—The Burma government is said to have contracted for an aerial survey of the mineral resources in 600 square miles of country in Lower Burma during the dry season which is about due. The government is also reported to have arranged for a joint Union of Burma-Japanese venture which will develop various iron ore deposits in the country and establish a smelting industry.

MALAYA—*Kuala Kampar Tin Fields Ltd.* believes that the life of its No. 1 dredge has been extended for more than 15 years by the drilling indications made on newly acquired mining leases. Two years ago it was thought that the remaining reserves for the No. 1 dredge were insufficient to allow this plant to continue for more than 2½ years. During the interim period, however, the additional leases were acquired on adjoining property.

SOUTH KOREA—The *Korea Tungsten Mining Company* hopes to have produced 1,648.8 tons of scheelite during the second half of this year. The firm has concentrated on scheelite during this period. Other output goals for the six-month period are 150 tons of wolframite, 24 tons of molybdenum, 188.76 tons of bismuth, and 1,500 tons of copper ore.

BRITISH COLUMBIA—*Cariboo Gold Quartz Mining Company Ltd.* has started an exploration program on the *Mosquito Creek* section of its original property at Wells. The prospect lies on the opposite side of the *Aurum* workings which the company acquired a few years ago from *Island Mountain Mines Ltd.* As part of the program, it is expected that one of the intermediate levels of the Aurum or Island Mountain will be extended to under cut the Mosquito Creek ore occurrences. At the *French* mine in which Cariboo retains a 25 percent interest, the new mill is now in operation. By the first of the year it is expected to be brought up to handle 40 tons daily of ore averaging about 0.8 ounce per ton.

ALASKA—After years of litigation, the Yakobi Island nickel deposits will finally see some exploration activity. Drilling is expected to proceed next spring on the extensive nickel deposits there. Yakobi Island is located at the northwest end of Chichagof Island.

MANITOBA—The 30-mile railroad spur linking *International Nickel Company of Canada's* Thompson mining area with the Canadian National Railways' Hudson Bay line at Sipiwesk has been completed before the winter freeze-up. This permits Inco to expedite work on its $175,000,000 nickel project by moving in the necessary heavy equipment and materials required to proceed with development. Most of the supplies and equipment already at the site had been brought in by tractor train durng the last freeze-up.

QUEBEC—*Jones & Laughlin Steel Corporation* has completed this season's diamond drilling program on the optioned property of *Quebec Cobalt and Exploration Ltd.* of Montreal. Cores will be examined during the winter, and diamond drilling resumed in the spring of 1958. The company has a two-year option on the property with a guaranteed minimum expenditure of $250,000. The property is located in the Mt. Wright area of New Quebec, about 190 miles north of the port of Seven Islands and 40 miles west of the Hollinger-North Shore Railroad which also serves the Knob Hill-Labrador iron deposits 180 miles north of Mt. Wright.

ONTARIO—*Rio Tinto Mining Company of Canada's* exploration subsidiary,

Korean Gold Mine Uses Limited Facilities

The Ku-Ma gold mine in Kyungsang Pukto Province of Korea, shown above, was reopened in 1956 by Richard S. Whitcomb, a retired United States Army general. Native Korean miners and simple hand-methods are used in the operation. In the view pictured above, the central main ore dressing shed is located in the background on the left; the blacksmith shop and engine-generator shop are shown at right center; and in the right foreground is another dressing shed. The Ku-Ma mill is located a short distance away.

Rio Canadian Exploration (Riocanex), has concluded an agreement with *Detta Minerals* on a molybdenum property in the Patricia mining district, Echo township, northwestern Ontario. Riocanex and *Sogemines Ltd.*, a Belgian mining firm, will explore the property in partnership. Some diamond drilling is to be undertaken this winter.

NORTHWEST TERRITORIES—*Giant Yellowknife Gold Mines* is installing a plant which will recover a large amount of the gold now being lost in residues. The company has been conducting a metallurgical research program for some time and pilot plants tests on a method of retreating the calcine residues has been encouraging but the firm does not think this is the final answer to the problem, and research work will continue. Ore development in the past year was largely confined to areas in which ore reserves had been previously calculated and therefore no new ore was added to the ore position.

QUEBEC—*Bellechasse Mining Corporation* has an interest in *Duncan Range Iron Mines Ltd.* and its 60 unpatented claims on the southeast side of Duncan Lake in the Ungava region about 600 miles northwest of Montreal. Preliminary and limited sampling of the property has shown that while the silica content is high, sulphur and phosphorus impurities are low, according to company officials.

SASKATCHEWAN—The Saskatchewan Research Council has developed a recovery process which may lead to mining of Canada's vast reserves of low-grade uranium ore. The scientists are experimenting with ore from the Bleasdell Lake area under a contract with *Columbia Metals Exploration Company*. A flotation machine capable of processing 50 to 100 pounds of uranium ore an hour has been installed. The process involves placing finely ground ore in a unit containing water and a flotation reagent. The reagent causes uranium oxide particles to adhere to froth on the surface and they can then be drained off. The concentrate is then leached to dissolve the uranium oxide and then precipitated into a solid state. The U.S. AEC has had no success with flotation methods.

BRITISH COLUMBIA—*Riocanex*, the *Rio Tinto Company of Canada's* exploration subsidiary, is concentrating on prospecting in British Columbia. It has acquired an option on a copper prospect in the name of *Ancon Copper* which adjoins property held by *Consolidated Mining and Smelter Company* in the Jordan River area. A 7,000-foot tunnel has been driven by Consolidated on its property known as the *Sunro* to open up fair tonnages of copper ore indicated by drilling. On the Ancon property, Riocanex reports two places where copper mineralization has been found.

QUEBEC—Two United States financiers whose identities have not been revealed are reported to have loaned $400,000 to *Aconic Mining Corporation* in return for interest on the loan and the option to take shares at 35¢. The company holds leases covering an area of about 90 square miles on the estuary of the St. Lawrence River and part of this money will be used to prospect the area more thoroughly. It has already been established that the sand contains high-quality iron ore which is comparatively easy to treat. German interests have been involved in the purchasing of this iron.

ONTARIO—*Algom Uranium Mines Ltd.* reports that during the six months its new mills at Quirke Lake and Nordic Lake have been in operation, a total of 1,097,470 tons of ore have been milled giving an average daily production of 3,000 tons at each mill. The average head content of the ore processed by the mills during the same period was 2.32 pounds of uranium per ton.

ALASKA—The *P.R. & H. Mining Company* has moved its operations from the Circle district, where it mined for many years, to the *Gagron* ground in the Peters Creek area of the Talkeetna country.

QUEBEC—*Continental Iron and Titanium Mining Ltd.* has announced plans for building a plant for extracting rutile from ilmenite, and an industrial pilot plant for production of artificial rutile by pressure leaching of ilmenite concentrate. Cost of both projects would be about $1,300,000. The project would be in the St. Urbain area of Quebec where the company holds ore deposits.

ALASKA—Officers of the Chilkat Indian village have leased 527 acres of the Klukwan Indian Reservation to the *Klukwan Iron Ore Corporation* for 10 years. The corporation owns 160 claims adjoining the reservation. The lease is subject to the approval of the U.S. Secretary of the Interior. A similar and tentative lease was negotiated in April 1956 but was not approved by the Secretary because there was no statutory authority at the time for leasing Indian reservations in Alaska. That situation has since been corrected by a bill in Congress.

NEWFOUNDLAND—Drilling and underground work is reported to have delineated at least 27,825,000 tons of chrysotile asbestos ore on the property of *Advocate Mines Ltd.* on Burlington Peninsula. Present proposal is to bring the property into production at a rate of 3,000 tons per day, for four years, and then to increase to 5,000 tons daily. The firm believes that low-cost open pit methods could be used.

ALASKA—Moving of the *U.S. Smelting, Refining and Mining Company's* Gold Hill dredge will begin next March. It will be taken overland to Sheep Creek on the east side of Ester Dome. The dredge was shut down this past summer and dismantled. Heavier parts of the superstructure have been removed to lighten the load. The remaining weight of the six-cubic-foot dredge will be 600 tons. It will be moved on sleds in one piece, hauled by D-8 Caterpillar tractors. Opened in 1938, the Sheep Creek mining ground was not worked in large proportions. Stripping was started in 1952, and thawing of the ground began this summer. The dredge will be set up next spring and the ground will be worked during the next season. Seven years ago this same dredge was moved from Upper Ester Creek and floated to its present location by means of a canal sluiced out by the company. In the past 10 years, U.S. Smelting has made three other major moves in the Fairbanks area. These included the transfer of the former Gold Stream dredge to Fairbanks Creek and the Cleary dredge which was hoisted over the hill to little Eldorado Creek. The latter dredge was moved again in a few years to Dome Creek.

YUKON TERRITORY—Management of *Galkeno Mines Ltd.* has decided to suspend production in favor of concentration on the depth development program at its silver-lead-zinc properties in the Mayo district. The depth program includes both a shaft and a low level adit, with priority being given to the shaft for the time being. It is expected that crosscutting to the McLeod vein from the 500 level of the new shaft should be completed by the end of this year. Ore developed on the bottom or 500 level has been diluted by wet ground which has not drained off as quickly as expected. The depth program is expected to provide adequate drainage of the ore-bearing structure before mining is undertaken there, offering a substantial reduction in operating costs.

BRITISH COLUMBIA—*Granby Consolidated Mining, Smelting and Power Company, Ltd.* has delayed production at its rehabilitated *Phoenix* copper mine near Greenwood, pending higher copper prices. However, it is continuing exploration at the *Granduc* copper mine in northern British Columbia, and has agreed to manage *Western Nickel's* mine near Hope. It will supply Western Nickel with $400,000 worth of equipment salvaged from its closed *Copper Mountain* operation.

QUEBEC—*Barvue Mines Ltd.* has suspended operations at its property in Barraute Township because of low zinc prices. The 5,300-ton-per-day concentrator will be kept intact ready to resume operations when there is any reasonable increase in price. Reserves at the beginning of 1957 were estimated at 3,843,000 tons grading 3.5 percent zinc and 1.2 ounces silver per ton.

ALASKA—Dredge No. 8 of the *U.S. Smelting, Refining and Mining Company* finished the season by working its way across the Steese Highway near the mouth of Engineer Creek. The highway had to be diverted around the dredge pond temporarily as the dredge made its way across the present road. Constructed in 1929, the dredge has worked its way from above Fox up the Goldstream and into Pedro and Gilmore Creeks, then back down Goldstream to Engineer Creek. Now, after 2½ years, it has finished on the west side of the highway and no further plans are anticipated for this dredge at present.

EUROPE

EIRE—Further development of the copper deposits at Allihied, County Cork, by the *Emerald Isle Mining Company* appears encouraging despite the present low in copper prices. It is reported that the grade of copper improves with depth, and ore reserves of 1,000,000 tons are now anticipated. Metallurgical testing showed that no problems will be encountered in treating the ore and that a simple flotation process will produce a high-grade copper concentrate. Dewatering of the *Mountain* mine has progressed to the 77 fathom level and future plans are to explore potential ground in the areas east of the 77 fathom level and the 112 fathom level. Flat underground holes will be drilled north from the Mountain mine to explore the Commonmoor lode and to investigate other possible parallel ore structures. Exploration of the *Caminches, Coom,* and *Kealoge* mines is also planned in the future. Emerald Isle Mining Company is a subsidiary of *Can-Erin Mines, Ltd.*

ITALY—Discovery of another potash deposit has been reported in Sicily, in the province of Enna. *Montecatini* and a subsidiary of the *Edison Company,* are now developing a potash deposit discovered in Sicily within the last three years.

AUSTRIA—Development of a magnesite deposit in Fieberbrunn, province of Tyrol, was begun recently by *Osterreichisch-Amerikanische Magnesite A. G. Radenthien.* The deposit is reported to contain reserves of 100,000,000 tons.

NORWAY—Mining activity has resumed in the old iron mining district along the southeastern coast of Norway. The *Langoey* mines at Krageror and the *Braastad* and *Klodeborg* mines at Arendall have been put into operation and other possibilities are being investigated.

YUGOSLAVIA—A $58,000,000 expansion program is planned at the Serbian copper mine, *Bor,* with $40,000,000 provided by French and Belgian investors. Copper production is expected to increase from 30,000 tons to 55,000 tons annually. The project will also include installation of a flotation plant with annual production of 40,000 kilos of silver and 2,500 kilos of gold, and a sulphuric acid plant with estimated production of 240,000 tons annually.

NORWAY—*Bleikvassli Mines,* in the Rana district of northern Norway, is developing a deposit of sulphide ore from which lead, zinc, and pyrite concentrates are produced by milling. Approximately $2,000,000 has been invested in the project and annual production of 100,000 tons of ore per year is anticipated.

AUSTRIA—Iron ore production for the first half of 1957 was 11 percent above the figure for the same period in 1956. Magnesite production also increased with magnesite sinter output up 8 percent and block magnesite 17 percent higher than last year's production.

PORTUGAL—*Beralt Tin & Wolfram Ltd.* has begun exploration of tin deposits on the newly acquired *Argimela* property. Some work has been done but it is reported that much more must be done before reliable estimates of the amount and grade of ore can be determined.

NORWAY—Advance orders for nearly one year's output have been received at the electrolytic aluminum plant now being constructed at Mosjoen in northern Norway. The plant, a joint venture of *Elektrokemisk A/S* of Norway and the Swedish concern, *AIAG,* is expected to begin production some time next spring, with test runs of the first electric furnaces scheduled for January. Annual production at the end of the first construction stage is estimated at 20,000 tons of aluminum ingots; orders now on hand call for 18,000 tons. Approximately Kr. 125,000,000 have invested in the project with Kr. 75,000,000 spent to provide hydroelectric power. A 520-foot pier is planned to accommodate cargo vessels up to 12,000 tons. Approximately 1,100 workers are now employed in construction work.

AUSTRIA—An SM kiln has been added to the steel works of *Eisenwerke Wordern,* province of Lower Austria, to increase production capacity to 15,000 tons of steel per month.

ITALY—Lead production declined during the first six months of 1957. Only 18,700 tons were produced this year,

compared with 20,300 tons produced during the same period in 1956. However, production of lead ore for the same period was 43,000 tons, an increase of 6.5 percent over 1956 production.

ITALY—Quicksilver exports for the first seven months of 1957 decreased to almost half of the total for the same period in 1956. This year's exports totalled 24,841 flasks, compared with 48,282 flasks for the same period last year.

NORWAY—A 54-inch Symons primary crusher will soon be installed at *A/S Sydvaranger's* operations at Kirkenes. This is the second crusher of this capacity to be installed there for the reduction of taconite ore.

ALBANIA—Chrome ore production is expected to increase 250 percent by 1960, through a development program set up in cooperation with Russia. Operations began recently at a chrome mine near Han, and four other chrome deposits are expected to be in production by 1960.

NORWAY—The *Boliden Company* of Sweden has begun development of a lead deposit in the Idre district, near the Swedish-Norwegian border. Mining operations are scheduled to begin in 1960. Production is estimated at 150,000 tons of ore annually, and indicated ore reserves should last for 30 years.

RUSSIA — Construction of 20 new aluminum plants will be included in Russia's current 5-year development plan. These plants will be fully mechanized with automatically controlled refining processes. Many other aluminum plants are now using the "spectral" method to analyze smelted aluminum, which has decreased the time spent on this operation to 1/20 of the time formerly spent.

GREENLAND—Metallurgical testings are being made on a 20-ton sample of uranium-bearing ore taken from a mountain in southern Greenland, according to Copenhagen geologist, Knud Ellitsgaard-Rasmussen. It has not yet been determined if the ore is of sufficient value to warrant development of the deposit.

ENGLAND—Several old tin and copper mines in central and western Cornwall have been reopened in a search for uranium. No workable deposits have been found as yet, but geochemical research has been encouraging and more intense exploration is in progress. A team of geologists, headed by S. H. U. Bowie, district geologist of the Atomic Energy Division of the English Geological Survey, is exploring the area, using a scintillometer for aerial search and electromagnetic equipment and Geiger counters for ground work. Reports are optimistic but no definite findings have been announced. In the British Isles, Cornwall is considered the most likely area for workable deposits although traces have also been found in Scotland and the Isle of Man. Thorium, which can be used to manufacture uranium 233, has been found in Scotland but the deposits were insufficient to warrant profitable development. Further search is underway.

POLAND — Estimated sulphur reserves reported by Polish engineers to be as great as 110,000,000 tons have been discovered near Tarnobrzeg in Rezeszow township. If these figures are accurate, development of the deposits could place Poland third as a world producer of sulphur. The ore body averages 30 feet in width and is located from 195 to 265 feet beneath the surface. Sulphur content of the ore averages 29 percent. 1958 production is expected to reach 55,000 tons and by 1959-60, a total of 30,000 tons of should be produced annually. A recent agreement between Poland and Czechoslovakia provides that, beginning in 1961, between 200,000 and 220,000 tons of Tarnobrzeg ore will be shipped to Czechoslovakia in exchange for consumer goods, machines, and equipment. Russia will also provide technical assistance on the project. Further expansion is indicated in plans for the development of four additional sulphur mines by 1970, which are expected to supply a total of 1,000,000 tons of pure sulphur yearly.

NORWAY—Dedication of a new, six-story flotation plant marked the completion of *Bleikvassli Mining Company's* Kr. 15,000,000 expansion and development program at its zinc and lead mine in northern Norway. Production will be stepped up from 30,000 tons to 100,000 tons of ore annually. The Bleikvassli district is said to have the richest deposits of zinc and lead ore in Norway. Known reserves should last 20 years or longer at a production rate of 100,000 tons annually. Eventually production may reach 14,000 tons of zinc concentrate, 5,000 tons of lead concentrate, and 35,000 tons of pyrite annually, with an export value of about Kr. 15,000,000. Development of the nearby *Mofjellet* zinc and lead mine is also nearing completion.

ENGLAND — British steel authorities are undecided over the best location for a possible new steelworks. Over 85 percent of all iron ore produced in England during 1956 came from Northampton Sands, Frodingham, and Oxforshire deposits, and it would seem probable a new steelworks would be located in one of these areas. Production at Frodingham, operated by the *United Steel Group*, is expected to increase but iron content of the ore is low (18 percent) and mining costs are high due to the large amount of overburden so the ore must be used in area in which it is mined in order to be profitable. At the Oxfordshire field, operated by *Oxfordshire Ironstone Company, Ltd.* (jointly owned by *Stewarts & Lloyds* and *Guest, Keen Iron & Steel*), the ore is nearer the surface and the iron content is 22 to 24 percent. However, no steel industry could be developed there because of the inadequate water supply and ore must be shipped 90 miles to South Wales. According to reports, the logical site for a steel industry, using local ore, would be the Northampton Sands area. Stewarts & Lloyds and Guest, Keen control existing production but exploration has indicated that large tonnages of ore may be found northeast of the present development. It is estimated that it will take a year or two before drilling can get underway and the amount of ore be determined, and an additional five years will be necessary to develop mining operations and construct the steelworks. The possibility remains that foreign ore may be used in any new steelworks. Although domestic ore is less than half the cost of foreign ore before smelting, imported ore is twice as rich in iron content. Thus the advantage of cheaper home ore is lost after smelting.

U.S.S.R.—Large-scale expansion plans for Soviet gold mining have been announced and a number of technicians have already been moved to Irkutsk on the Lena River. Last year's output was estimated at 10,000,000 ounces.

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U.S.A. Metal & Mineral Prices

METALS

		November 18, 1957
COPPER:	**Electrolytic.** Delivered F.o.b. cars, Valley basis	27.00¢
	Lake. Delivered, destinations, U.S.A.	27.00¢
	Foreign Copper, Valley basis	27.00¢
	Custom	26.00¢
LEAD:	**Common Grade.** New York	13.50¢
ZINC:	**Tri-State Concentrate,** 80% lead	$163.32
	Prime Western: F.o.b. E. St. Louis	10.00¢
	Prime Western: Delivered, New York	10.50¢
ALUMINUM:	**Tri-State Concentrate,** 60% zinc, per ton	$56.00
ANTIMONY:	**Primary 30 Pound Ingots (99% plus).** F.o.b. shipping points	28.10¢
BISMUTH:	**Lone Star Brand. F.o.b. Laredo, in bulk**	33.50¢
CADMIUM:	(In ton lots) price per pound	$2.25
COBALT:	**Sticks and bars.** 1 to 5 ton lots (Price per pound)	$1.70
COLUMBIUM:	**97.99%,** keg of 550 pounds (Price per pound)	$2.00
GERMANIUM:	**Powder** Nom., per pound	$120.00
LITHIUM:	**Germanium:** dioxide, high purity, gram	24.00¢-30.00¢
	98% (per pound)	$11.00-$14.00
MAGNESIUM:	**Carbonate**	82.00¢
MERCURY:	**Ingots (98.8%)** F.o.b. Valasco, Texas, per pound	36.00¢
NICKEL:	**Flasks.** Small lots, New York	$228.00-$231.00
PLUTONIUM:	**"F" Ingots (5 pounds).** F.o.b. refinery, Port Calbourne, Ontario	75.50¢
	To July 1, 1962 AEC will pay $30.00 to $40.00 per gram depending on plutonium 240 content. July 1, 1962 to June 30, 1963, per gram	$30.00
SELENIUM:	**99.5%,** per pound	$10.50
THORIUM:	per kilogram	$43.00
TIN:	**Grade A Brands.** New York (Price per pound) Prompt delivery	89.875¢
TITANIUM:	**99.3%** + Grade "A" Sponge (Price per pound)	$1.65-$2.5(
URANIUM:	**Nominal,** per kilogram	$40.00
U-235:	**Nominal,** per pound	$7,725
GOLD:	**United States Treasury Price**	$35.00 per ounce
SILVER:	**Newly mined domestic.** United States Treasury price	90.50¢
	Foreign Handy Harmon	90.375¢
PLATINUM:	**Per Ounce**	$82.00-$87.00
ZIRCONIUM:	**Sponge, Per Pound,** Nominal	$10.00

ORES AND CONCENTRATES

BERYLLIUM ORE:	**10 to 12% BeO.** F.o.b. mine, Colorado	$46.00 per unit
	Small lot purchases at Custer, S. D., Spruce Pine, N. C., and Franklin, N. H. Visual inspection at $400.00 per short ton or by assaying at: 8.0 to 8.9% BeO, $40 per unit; 9.0 to 9.9%, $45; over 10.0%, $50.	
CHROME ORE:	F.o.b. railroad cars eastern seaports. Long tons dry weight.	
	African (Rhodesian). 48% Cr_2O_3. 3 to 1 Ratio	$50.00-$52.00
	African (Transvaal). 48% Cr_2O_3. No ratio	$39.00-$40.00
	Turkish, 48% Cr_2O_3. 3 to 1 chrome-iron ratio	$52.00
	U. S. Government ore purchase depot Grants Pass, Oregon, Base price, lumpy ore, $115.00; fines and concentrates $110.00 for 48% Cr_2O_3 and a 3 to 1 chromium-iron ratio. Premiums for higher grade ore and for a ratio up to 3.5 to 1. Penalties for grades down to 42% Cr_2O_3.	
COLUMBIUM-TANTALUM ORE:	At United States small lot beryl purchase depots. $3.40 per pound contained combined pentoxides in 50% ore. Includes 100% bonus. (Government stopped buying temporarily May 12)	
IRON ORE:	**Per Pound Pentoxide.**	$1.15-1.35
	Lake Superior. Per gross ton Lower Lake Ports	
	Mesabi, Non Bessemer, 51.5% Fe.	$11.45
	Mesabi, Bessemer, 51.5% Fe.	$11.60
	Old Range Non Bessemer	$11.70
	Old Range Bessemer.	$11.85
	Swedish, Atlantic Ports, 60 to 68% Fe Contracts, Per Unit	26.00¢
MANGANESE ORE:	**Metallurgical grade.** 48 to 50% Mn. Long ton unit	$1.40-$1.45
	Metallurgical grade. 46 to 48% Mn. Long ton unit	$1.35-$1.40
	Metallurgical grade. 44 to 46% Mn. Long ton unit	$1.30-$1.35
	Domestic U. S. Government ore purchasing depots: Butte, Montana; (black and pink ores) base price of $4.87 per long dry ton of 18% manganese ore Phillipsburg, Montana; base price of $6.43 per long ton of 15% manganese ore. Small lot program f.o.b. railroad cars, minimum 40% Mn. Base price (48%) $2.30 per unit with premiums and penalties.	
MOLYBDENUM CONCENTRATE:	**90% MoS_2 F.o.b.** Climax, Colorado. Per pounds of contained molybdenum, plus cost of containers	$1.18
TUNGSTEN CONCENTRATE:	**Domestic.** 60% WO_3 Per short ton unit Government not buying	$55.00
	Foreign. 65% WO_3 Per short ton unit (Scheelite)	$15.00
	Foreign. South American, Spanish, Portuguese	$14.00
URANIUM ORE:	**Carnotite-Roscoelite.** F.o.b. purchase depot or company mill plus $0.06 per ton mile ($6.00 maximum), Grand Junction, Rifle, Durango, Naturita and Uravan, Colorado. Salt Lake City, Marysvale, Thompsons, Moab, Green River, Mexican Hat, and Monticello, Utah. Shiprock, and Grants, New Mexico, Edgemont, S. Dakota, Jeffrey City, Wyoming, Tuba City, Arizona. Base price for 0.10% ore is $1.50 per pound and up to $3.50 per pound of contained U_3O_8 plus $0.75 per pound for each pound in excess of 4 pounds per short dry ton and an extra allowance of $0.25 per pound for each in excess of 10 pounds. A $0.50 per pound development allowance paid on all ore purchases. Special lime schedule applies at Monticello, Moab and Grants. No lime penalty with no vanadium payment or lime penalty with vanadium payment.	
VANADIUM ORE:	**Carnotite-Roscoelite.** V_2O_5 in ratio of more than 10 parts to 1 part of U_3O_8 are generally acceptable at all AEC depots, but excess not paid for at Marysvale, Monticello, and Bluewater. Shiprock has no limit on V_2O_5 to U_3O_8 ratio and all contained V_2O_5 is paid for Per Pound V_2O_5	$0.31

NON-METALLIC MINERALS

BENTONITE:	**Minus-200-mesh.** F.o.b. Wyoming points. Per ton in carload lots	$12.50
	Oil Well grade. Packed in 100 pound paper bags	$14.00
FLUORSPAR:	**Metallurgical grade.** 72.5% effective CaF_2 content per short ton F.ob. Illinois-Kentucky mines	$34.00-$36.00
	Mexican. 70% F.o.b. border	$24.00-$24.50
	Acid Grade. 97% CaF_2, Bulk, F.o.b. Kentucky, Illinois, Colorado	$47.00-$50.00
	Government buying F.o.b. producer's shipping point: 60% Illinois-Kentucky, $34.50 per ton, others $28.50; 70% Ill.-Ken. $38.50, others $32.50	
PERLITE:	**Crude:** F.o.b. mine per short ton	$3.00 to $5.00
	Plaster grades. Crushed and sized. F.o.b. plants	$7.00 to $9.00
SULPHUR:	Long ton, F.o.b. Hoskins Mound, Texas	$23.50
	Export	$24.00-$26.00

LONDON METAL AND MINERAL PRICES

		November 18, 1957 Per Long Ton		USA Equivalent cents per pound
COPPER:	**Electrolytic spot**	£190	5s Od	23.78¢
LEAD:	**Refined 99%**	£ 84	10s Od	10.56¢
ZINC:	**Virgin, 98%**	£ 68	0s Od	8.50¢
ALUMINUM:	**Ingot, 95.5%**	£197	0s Od	24.625¢
ANTIMONY:	**Regulus, 99.6%**	£222	10s Od	27.81¢
TIN:	**Standard, 99.75%**	£730	10s Od	91.31¢
TUNGSTEN:	**Long ton unit**	108s		$15.12
		With Sterling pound at $2.80		

Quotations on metals and certain ores through the courtesy of *American Metal Market, New York, N. Y.*

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Drillers using the Longyear Wire Line Core Barrel lower an "overshot" through the drill string to bring up the Inner Tube containing core. Here's what this can mean to *your* operation:

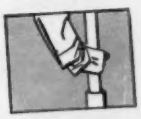
1 The drill string normally remains in the hole except when it is necessary to replace the bit. This eliminates much of the hard labor of drilling and allows more actual drilling time per shift.

2 Caving, the major cause of blocking and bit damage, is minimized. There is little chance for caving while the drill string is in the hole—which is most of the time.

3 Longyear Wire Line Core Barrels are equipped with the water shut-off valve. In closed circuit drilling (possible with Longyear transmission pumps), the shut-off valve gives an immediate, positive indication of a block in the core barrel, eliminating costly "hunches" on the part of the drill runner.

Wire Line experience includes hundreds of thousands of feet drilled in many kinds of formations. Reports consistently show lower costs per foot of core recovered. In one overseas operation, switching from conventional NX equipment to BX Wire Line increased footage from ten to forty-seven feet per shift. In most cases when drilling in ground that is difficult to core, Wire Line improves core recovery substantially.

Looking ahead to your next drilling project, keep in mind that Longyear offers a complete line of Core Barrels and expert technical assistance in the selection of the right equipment for the formation you want to drill.



At end of core run, overshot assembly is lowered by wire through drill string.

At bottom drill string, overshot latches on to spear of inner tube.

Core-bearing inner tube reaches the surface, is freed from overshot.

Core is removed. Meanwhile, stand-by inner tube is dropped into the hole so drilling can be resumed as soon as it is in position.

Longyear

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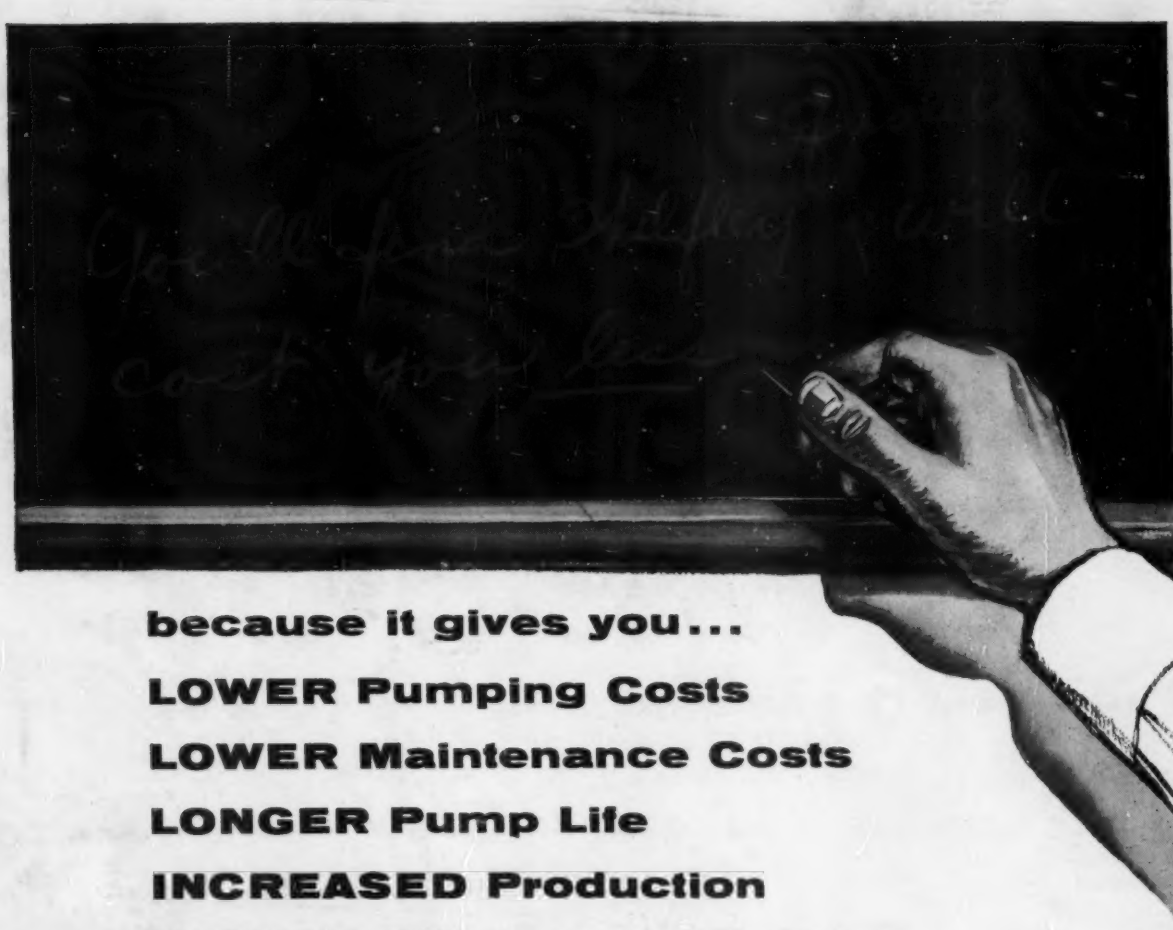

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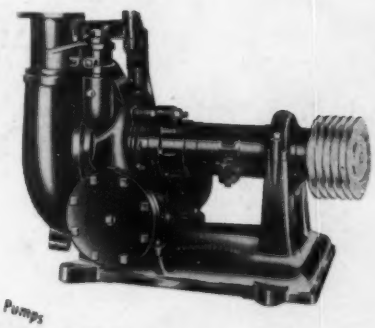

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